

# EXHIBIT U

Scott A. Guelcher, Ph.D.

Page 1

FOR THE UNITED STATES DISTRICT COURT  
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA  
CHARLESTON DIVISION

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IN RE: ETHICON, INC.,  
PELVIC REPAIR SYSTEMS  
PRODUCTS LIABILITY LITIGATION  
Master File No. 2:12-MD-02327  
MDL NO. 2327

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THIS DOCUMENT RELATES TO:

TONYA AND GARY EDWARDS  
vs.

ETHICON, INC., ET AL.,  
(Case No. 2:12-cv-09972)

JOSEPH R. GOODWIN  
U.S. DISTRICT  
JUDGE

and

JO HUSKEY AND ALLEN HUSKEY  
vs.  
ETHICON, INC., ET AL.,  
(Case No. 2:12-cv-05201)

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DEPOSITION OF SCOTT A. GUELCHER, PH.D.

Nashville, Tennessee

March 25, 2014

Reported by Marilyn Morgan, LCR #235, CCR #0174

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## Scott A. Guelcher, Ph.D.

Page 2

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Page 3

1 The deposition of SCOTT A. GUELCHER,  
 2 PH.D., taken on behalf of the Defendant and  
 3 taken pursuant to notice on March 25, 2014,  
 4 beginning at approximately 9:19 a.m., at 150  
 5 3rd Avenue, South, Nashville, Tennessee,  
 6 pursuant to stipulations of counsel.  
 7 S T I P U L A T I O N S  
 8 It is agreed that the court reporter,  
 9 being a notary public for the State of  
 10 Tennessee, may swear the deponent, take the  
 11 deposition on the Stenograph shorthand machine  
 12 and afterwards reduce the same to typewriting  
 13 when it may be used for all purposes provided  
 14 by the Federal Rules of Civil Procedure  
 15 governing depositions.  
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Page 4

1 I N D E X  
 2 WITNESS PAGE  
 3 SCOTT A. GUELCHER, PH.D.  
 Examination by Mr. Thomas . . . . . 5

4 E X H I B I T S  
 5  
 6 Number Description Page  
 7 Exh.1 Report 6  
 8 Exh.2 Notebook 8  
 9 Exh.3 Notebook 8  
 10 Exh.4 Notice of Deposition 9  
 11 Exh.5 Rebuttal Report 60  
 12 Exh.6 Anderson Study 71  
 13 Exh.7 1976 Study 73  
 14 Exh.8 Fayolle Study 93  
 15 Exh.9 Clave Article 102  
 16 Exh.10 Letter 165  
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Page 5

1 SCOTT A. GUELCHER, PH.D.,  
 2 after having been first duly sworn, was  
 3 examined and testified as follows:  
 4 DIRECT EXAMINATION  
 5 BY MR. THOMAS:  
 6 Q. Good morning, Dr. Guelcher. It's  
 7 Guelcher; is that correct?  
 8 A. That's right.  
 9 Q. I introduced myself to you before the  
 10 deposition. My name is David Thomas. I  
 11 represent Ethicon. I'm going to ask you a  
 12 number of questions today about your expert  
 13 reports in the Ethicon matters; fair enough?  
 14 A. Yes.  
 15 Q. I see that you have before you two  
 16 notebooks. What's in the notebooks?  
 17 A. So one of these notebooks is the  
 18 report with -- the first report that was filed  
 19 with the reliance documents from that. And the  
 20 second notebook is another notebook of support  
 21 documents.  
 22 Q. We'll both be doing that today so  
 23 take your time and don't worry about it.  
 24 The second notebook that you referred

2 (Pages 2 to 5)

Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 6</p> <p>1 to is additional support documents?</p> <p>2 A. Yes, that's right.</p> <p>3 Q. Do the additional support documents</p> <p>4 in the second notebook relate to the first</p> <p>5 report?</p> <p>6 A. Yes.</p> <p>7 Q. Do the two notebooks that you have in</p> <p>8 front of you represent the total of the</p> <p>9 reliance materials for the reports that you've</p> <p>10 provided in this matter?</p> <p>11 A. Yes.</p> <p>12 (Exhibit 1 was marked.)</p> <p>13 Q. (By Mr. Thomas) Let me show you what</p> <p>14 I've marked as deposition Exhibit No. 1.</p> <p>15 Deposition Exhibit No. 1 is what was provided</p> <p>16 to us as the Rule 26 expert report for you in</p> <p>17 this matter.</p> <p>18 When you referred to your first</p> <p>19 notebook as having the report and reliance</p> <p>20 materials, is Exhibit No. 1 the report to which</p> <p>21 you're referring?</p> <p>22 A. Yes.</p> <p>23 Q. On -- at the end -- I'm sorry.</p> <p>24 Exhibit B to Exhibit No. 1 is a list of</p>	<p style="text-align: right;">Page 8</p> <p>1 A. Yes.</p> <p>2 MR. THOMAS: We'll mark that as</p> <p>3 Exhibit No. 2.</p> <p>4 (Exhibit 2 was marked.)</p> <p>5 Q. (By Mr. Thomas) This was the first</p> <p>6 notebook to which you referred for your expert</p> <p>7 report and your reliance materials; fair?</p> <p>8 A. Yes.</p> <p>9 (Exhibit 3 was marked.)</p> <p>10 Q. (By Mr. Thomas) Deposition Exhibit</p> <p>11 No. 3 is a second notebook of documents that</p> <p>12 you brought with you that are your reliance</p> <p>13 materials for your expert report in the Ethicon</p> <p>14 case?</p> <p>15 A. Yes.</p> <p>16 Q. It's your testimony that the</p> <p>17 documents in Exhibits 2 and 3 are the total of</p> <p>18 the reliance materials for your expert report</p> <p>19 which we've marked as Exhibit 1?</p> <p>20 A. Yes.</p> <p>21 Q. All right. Did you bring with you</p> <p>22 any other materials for your deposition today?</p> <p>23 A. No.</p> <p>24 Q. Did you bring any billing records</p>
<p style="text-align: right;">Page 7</p> <p>1 reliance materials attached to your report?</p> <p>2 A. Yes.</p> <p>3 Q. Do you have that?</p> <p>4 A. Yes.</p> <p>5 Q. Is everything that is in the two</p> <p>6 notebooks that you've just identified for the</p> <p>7 record contained within the reliance materials,</p> <p>8 to your knowledge?</p> <p>9 A. Yes, I believe so.</p> <p>10 Q. Are there documents in this reliance</p> <p>11 list that are not contained in the two</p> <p>12 notebooks that you brought with you today?</p> <p>13 A. I don't think so.</p> <p>14 Q. Okay. Was it your intention when you</p> <p>15 brought the two notebooks that you've</p> <p>16 identified earlier today that you brought with</p> <p>17 you all the documents upon which you relied for</p> <p>18 the formulation of your opinions in the case?</p> <p>19 A. Yes.</p> <p>20 Q. Just for the record, the first</p> <p>21 notebook that you identified it has a title on</p> <p>22 it that says In Re: Boston Scientific</p> <p>23 Corporation, Product Liability Litigation,</p> <p>24 Expert Report of Scott Guelcher, Ph.D.</p>	<p style="text-align: right;">Page 9</p> <p>1 with you today?</p> <p>2 A. No. Dr. Dunn has those. That's</p> <p>3 subcontracted through Dr. Dunn.</p> <p>4 Q. Did you prepare billing records that</p> <p>5 you gave to Dr. Dunn?</p> <p>6 A. I have sent him some billing records,</p> <p>7 yeah. But I don't have those with me.</p> <p>8 Dr. Dunn has them.</p> <p>9 Q. Is there a reason why you didn't</p> <p>10 bring those with you here today?</p> <p>11 A. I haven't been bringing them to</p> <p>12 depositions. So everything is billed through</p> <p>13 him. So I don't have them with me.</p> <p>14 MR. THOMAS: Is there a reason why he</p> <p>15 hasn't produced those today?</p> <p>16 MR. JACKSON: It was my understanding</p> <p>17 he didn't have them, that they were all in</p> <p>18 the custody of Dr. Dunn.</p> <p>19 (Exhibit 4 was marked.)</p> <p>20 Q. (By Mr. Thomas) Let me show you</p> <p>21 what's been marked as deposition Exhibit No. 4.</p> <p>22 Deposition Exhibit No. 4 is a notice of your</p> <p>23 deposition for today as well as a document</p> <p>24 rider that requests that you bring certain</p>

3 (Pages 6 to 9)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 10</p> <p>1 documents with you to the deposition. Did you 2 review that in advance of your deposition? 3 A. Briefly. 4 Q. What did you do when you reviewed it? 5 For what purpose did you review it? 6 A. To pull the documents together. 7 Q. And I believe you've told me the only 8 documents that you've brought with you to the 9 deposition today are the ones that we've marked 10 in the notebooks of Exhibits Nos. 2 and 3? 11 A. That's right. 12 Q. Were there other documents that are 13 responsive to Schedule A on Exhibit No. 4 that 14 you didn't bring with you? 15 MR. JACKSON: I'm just going to note 16 that we have pending objections to several 17 of these scheduling requests. 18 MR. THOMAS: That's fine. 19 A. Let me look at this for a minute. 20 So I have provided an opinion on 21 other pelvic mesh cases, but I did not bring 22 that information with me because of the 23 consulting with the attorneys. I think 24 everything else is here, just looking at this.</p>	<p style="text-align: right;">Page 12</p> <p>1 Q. Do you have notes of the time that 2 you spent that you transfer over to Microsoft 3 Word? 4 A. I keep it on my calendar. 5 Q. And is your calendar a hard copy 6 calendar? 7 A. It's electronic on my phone. 8 Q. And the time that you have on your 9 electronic calendar on your phone is 10 transferred over to your Microsoft Word report 11 that you send to Dr. Dunn on a weekly basis? 12 A. That's right. Yes. 13 Q. And the report that you provide to 14 Dr. Dunn identifies the day that you worked? 15 A. It identifies the day, the time of 16 day, and the number of hours and the activity. 17 Q. Is that a form that you prepared or a 18 form that Dr. Dunn provided to you? 19 A. It's a form that I had from other 20 cases, other consulting, I should say. 21 Q. Other consulting with Dr. Dunn or 22 consulting you've done individually? 23 A. Consulting I've done individually 24 with other companies.</p>
<p style="text-align: right;">Page 11</p> <p>1 Q. (By Mr. Thomas) Let's look at 2 Paragraph 1 of Exhibit 1, Schedule A, all 3 documents related to fees, billing, and/or time 4 spent in connection with your opinions. 5 How do you keep your time in this 6 case? 7 A. I send activity reports to Dr. Dunn, 8 and then he -- I must have misunderstood this. 9 It's all billed through Dr. Dunn's company. So 10 I send everything to him in the form of weekly 11 activity reports and monthly invoices. 12 Q. Tell me the form that the weekly 13 activity reports take. 14 A. It's a table that lists the hours 15 that I worked per day, the specific time of the 16 day that I worked on it, and then a brief 17 description of the activity. 18 Q. And is this a report that you submit 19 to Dr. Dunn on a weekly basis? 20 A. Usually. The reports are all -- it's 21 a weekly summary. 22 Q. Is this a computer-generated report 23 or a hand-generated report? 24 A. It's a -- I do it in Microsoft Word.</p>	<p style="text-align: right;">Page 13</p> <p>1 Q. Are the weekly activity reports that 2 you submitted to Dr. Dunn on your computer 3 presently? 4 A. I think so. I don't think I deleted 5 those off my computer. 6 Q. Is that something you could have sent 7 to us today so we could -- 8 A. I can. Like I said, in the past, 9 I've not -- Dr. Dunn just had those, and I just 10 missed it. 11 Q. Okay. 12 A. I can send them to you. 13 Q. Yeah. I would like to be able to ask 14 questions about those today. So to the extent 15 we can get those sent over here and printed out 16 and used in the deposition -- 17 A. I can do that. 18 MR. JACKSON: Do you have somebody 19 who can log into your computer and get 20 these? It might be easier just to have 21 Dr. Dunn produce everything today. I can 22 probably have them do that. 23 MR. THOMAS: That would be great. 24 THE WITNESS: I would be more</p>

4 (Pages 10 to 13)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 14</p> <p>1 comfortable for him doing that because he 2 does the actual billing. That's why I was 3 confused. But I think if he can send the 4 reports, it would be better because I don't 5 know that I've -- I mean, I send them to 6 him and I -- 7 MR. JACKSON: It may be that he was 8 deposed prior to you previously, so it 9 didn't matter. 10 THE WITNESS: That would be the most 11 accurate version of what's available. 12 MR. THOMAS: Let's go off the record 13 a second. 14 (Discussion off the record) 15 (Ms. Lewis joined the deposition by 16 teleconference.) 17 MS. LEWIS: This is Christina Lewis. 18 I'm with the Mueller Law Office, and we 19 represent Mr. and Mrs. Edwards in this 20 case. 21 And I would like an agreement from 22 defense counsel that all objections by 23 counsel for Huskey are the same as us. If 24 we can have that agreement, I'll put my</p>	<p style="text-align: right;">Page 16</p> <p>1 Q. Okay. And then you've consulted with 2 attorneys with respect to Ethicon products? 3 A. Yes. 4 Q. For a total of three? 5 A. Ethicon would be the fourth product. 6 There are two AMS products. 7 Q. Okay. And have you given deposition 8 testimony in the AMS cases? 9 A. One of the AMS cases and the Boston 10 Scientific case. 11 Q. So have you given a total of two 12 depositions? 13 A. Yes. 14 Q. What is the product at issue in the 15 AMS case where you've given a deposition? 16 A. I believe it was the SUI. 17 Q. And what is the product at issue in 18 the Boston Scientific case where you've given a 19 deposition? 20 A. There were several products. I can't 21 remember the names right now. Pinnacle maybe. 22 There were five of them, but I can't remember 23 all the names. 24 Q. For what application were those</p>
<p style="text-align: right;">Page 15</p> <p>1 phone on mute so that I don't disrupt the 2 deposition too much. 3 MR. THOMAS: That's fine with me. 4 MS. LEWIS: Thank you so much, and I 5 apologize for the confusion. 6 MR. THOMAS: Not a problem. 7 Q. (By Mr. Thomas) Have you requested 8 that Dr. Dunn supply those activities records? 9 A. Yes. He's not in his office, but 10 he's going to call me when he gets there. If 11 he'll e-mail them to me, I can get them printed 12 out. 13 Q. Very good. 14 Dr. Guelcher, you testified a moment 15 ago that you have consulted with attorneys on 16 matters involving other mesh products; is that 17 fair? 18 A. Yes. 19 Q. How many? 20 A. Three other products. 21 Q. And what are the manufacturers of 22 those products? 23 A. American Medical Systems and Boston 24 Scientific.</p>	<p style="text-align: right;">Page 17</p> <p>1 products used? For the same application? 2 A. Same application. 3 Q. For stress urinary incontinence? 4 A. Yes, I believe so. 5 Q. When were you first contacted about 6 providing expert opinion with respect to 7 Ethicon? 8 A. With respect to Ethicon would have 9 been -- I don't remember the exact date. Maybe 10 a month ago. 11 Q. How were you contacted? 12 A. By the attorneys at Wexler. 13 Q. Prior -- is it your practice when you 14 get contacted to make notations in your 15 activity log about contacts with counsel? 16 A. I'm not sure what you mean. 17 Q. Would we be able to go back and look 18 at your activity reports that you have already 19 identified that Dr. Dunn is going to give to us 20 to find out when you were first contacted about 21 this litigation? 22 A. In this case, I believe that would 23 be -- that information would be in the activity 24 report.</p>

5 (Pages 14 to 17)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 18</p> <p>1 Q. Okay.</p> <p>2 A. I believe.</p> <p>3 Q. Were you contacted directly about</p> <p>4 providing expert opinions with respect to</p> <p>5 Ethicon, or did they go through Dr. Dunn?</p> <p>6 A. It came through Dr. Dunn.</p> <p>7 Q. And were you on a conference call</p> <p>8 with Dr. Dunn and counsel for plaintiffs in the</p> <p>9 case? Is that how you first got brought into</p> <p>10 the case?</p> <p>11 A. No. Dr. Dunn called me in the</p> <p>12 evening and we discussed it.</p> <p>13 Q. And what did Dr. Dunn tell you?</p> <p>14 A. That the attorneys at Wexler Wallace</p> <p>15 wanted us to write an expert report for the</p> <p>16 Ethicon case.</p> <p>17 Q. And did you and Dr. Dunn discuss the</p> <p>18 details of the scope of the expert report that</p> <p>19 you were preparing for the Ethicon case?</p> <p>20 A. Yes.</p> <p>21 Q. And tell me what you discussed during</p> <p>22 that call about the scope of the report.</p> <p>23 A. Well, the scope of the report would</p> <p>24 primarily be teaching with respect to the</p>	<p style="text-align: right;">Page 20</p> <p>1 Dr. Dunn contacted you about preparing this</p> <p>2 expert report for use in this litigation, that</p> <p>3 you then began to -- your understanding of the</p> <p>4 Ethicon mesh products used to treat stress</p> <p>5 urinary incontinence?</p> <p>6 A. A detailed understanding -- I had</p> <p>7 been studying the effects of in vivo</p> <p>8 polypropylene oxidation for some time, maybe</p> <p>9 six months prior to that. But the details of</p> <p>10 the Ethicon mesh started at the time I talked</p> <p>11 to Dr. Dunn.</p> <p>12 Q. And the work that you did on the --</p> <p>13 the six months work that you just discussed</p> <p>14 that you did was with respect to the meshes of</p> <p>15 other manufacturers?</p> <p>16 A. With respect to the meshes of other</p> <p>17 manufacturers and also the oxidative</p> <p>18 degradation of polypropylene in general.</p> <p>19 Q. Was the work that you did with</p> <p>20 respect to the Ethicon SUI mesh products</p> <p>21 different from the work that you did analyzing</p> <p>22 the AMS products or the Boston Scientific</p> <p>23 products?</p> <p>24 A. It was different in the sense that we</p>
<p style="text-align: right;">Page 19</p> <p>1 oxidation of polypropylene. We didn't have any</p> <p>2 samples. So it was all -- the report was</p> <p>3 essentially based on literature and documents</p> <p>4 from Ethicon about the oxidation of</p> <p>5 polypropylene.</p> <p>6 Q. Did you divide responsibilities for</p> <p>7 the report during the call?</p> <p>8 A. Dr. Dunn and I wrote separate</p> <p>9 reports. My report focused more on oxidation</p> <p>10 of polypropylene, particularly the response in</p> <p>11 the body.</p> <p>12 Dr. Dunn's area of expertise is in</p> <p>13 product design, polymer science. So he</p> <p>14 addressed issues more related to safety</p> <p>15 analysis, those types of questions.</p> <p>16 Q. Prior to the conversation that you</p> <p>17 had with Dr. Dunn about a month ago concerning</p> <p>18 this potential expert report, had you studied</p> <p>19 Ethicon mesh products at all?</p> <p>20 A. No, I wouldn't say studied. I was</p> <p>21 familiar that the products existed because of</p> <p>22 the other litigation, but I had not studied</p> <p>23 Ethicon products in particular.</p> <p>24 Q. So is it fair to understand that when</p>	<p style="text-align: right;">Page 21</p> <p>1 didn't have samples, either materials as made</p> <p>2 or materials that had been explanted from the</p> <p>3 body. We didn't have those samples.</p> <p>4 So we focused in the reports more on</p> <p>5 the literature, internal documents, more on the</p> <p>6 oxidative degradation of polypropylene.</p> <p>7 Q. Have you ever analyzed an Ethicon</p> <p>8 mesh used for the treatment of stress urinary</p> <p>9 incontinence?</p> <p>10 A. I have not. I don't have the sample.</p> <p>11 Q. Have you ever analyzed an explant of</p> <p>12 mesh manufactured by Ethicon for the treatment</p> <p>13 of stress urinary incontinence?</p> <p>14 A. No, not to my knowledge.</p> <p>15 Q. Have you ever requested to analyze a</p> <p>16 mesh manufactured by Ethicon for the treatment</p> <p>17 of stress urinary incontinence?</p> <p>18 A. Not to my knowledge. But a lot of</p> <p>19 the product testing was done by Dr. Dunn.</p> <p>20 Q. Have you ever requested to a mesh</p> <p>21 explant manufacturer for Ethicon, for the</p> <p>22 treatment of stress urinary incontinence, for</p> <p>23 the purposes of your own analysis?</p> <p>24 A. I have not done that directly.</p>

6 (Pages 18 to 21)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 22</p> <p>1 Dr. Dunn had some materials from manufacturers 2 and I don't remember exactly what. But 3 personally I have not requested samples. 4 Q. Did you have conversations with 5 Dr. Dunn about the availability of mesh samples 6 for testing? 7 A. I think in this case, to the extent 8 that we didn't have them. 9 Q. My question was, did you have 10 conversations with Dr. Dunn about the 11 availability of mesh samples for testing? 12 A. I mean, we discussed it. But the 13 problem was we didn't have the samples. So 14 they weren't available. 15 Q. Did you request samples to conduct 16 testing? 17 A. I did not. I don't know what he did. 18 But I know that the time was short between when 19 we had to get the report submitted and when the 20 request came. So there was also a time 21 constraint. There wasn't time to do it. 22 Q. Now, did the work that you did in the 23 AMS and Boston Scientific litigation follow the 24 same pattern in terms of what you did for those</p>	<p style="text-align: right;">Page 24</p> <p>1 a different case. So I guess I'm concerned 2 about disclosing something I'm not allowed to 3 disclose. 4 Q. Would you like to consult with 5 counsel? 6 A. I would, if that would be okay. 7 Q. Just for the record, just for your 8 benefit, I'm going to want to know all the 9 kinds of tests that were conducted on the AMS 10 and Boston Scientific meshes and the purposes 11 of those tests. 12 If he's not going to be permitted to 13 answer that, then we'll figure out the next 14 path to take. 15 MR. JACKSON: The question is 16 how far the protective orders go in the 17 state courts that are involved. So Boston 18 Scientific state court litigation was in 19 Delaware and Massachusetts. And the AMS 20 litigation was at the MDL level. 21 MR. THOMAS: Just so you know, I'm 22 not going to argue with you about it. 23 Either you're going to let him answer or 24 you're not. I am going to go to court and</p>
<p style="text-align: right;">Page 23</p> <p>1 cases? 2 A. Well, in the AMS and Boston 3 Scientific studies, we had exemplars and we had 4 in some cases explanted materials. There may 5 have been materials from Ethicon. I just don't 6 remember because it wasn't part of that 7 specific case. And Dr. Dunn did that testing, 8 and he would know. 9 Q. Okay. In the AMS litigation, what 10 kind of testing did you conduct on AMS exemplar 11 mesh? 12 A. So can I talk with -- this or other 13 cases, I don't know how much detail I can 14 disclose on this. These are other cases that 15 are by protective court order, so I don't know 16 what I can say or not say in terms of the 17 details. 18 Q. I'm asking now only what kind of 19 testing that you performed, not what the 20 results of those tests were. 21 A. Right. But I don't know that -- 22 because it's a protective order, I don't know 23 that I could even disclose the tests that we 24 did because it was somebody else's material on</p>	<p style="text-align: right;">Page 25</p> <p>1 seek to get the answers because I think 2 it's very important to what's going on 3 here. 4 So either he's going to answer or 5 he's not. I'm not going to argue with you 6 about it. 7 MR. JACKSON: I think the questions 8 he's asked, you need to answer them at this 9 point. 10 A. Okay. So could you repeat it? I 11 have lost track. 12 Q. (By Mr. Thomas) What kinds of tests 13 did you conduct on the exemplar meshes for AMS? 14 A. So for AMS, we did gel permeations 15 chromatography, GPC. I should say Dr. Dunn did 16 all the testing. I'm telling you what I 17 remember. So in some of this would be my 18 report so it's not an all inclusive list, but 19 it's what I remember. 20 Q. Very good. 21 A. We did GPC. I know he took a number 22 of photographs under the microscope. 23 Q. Light microscopy or SCN? 24 A. Light microscopy. I think there was</p>

7 (Pages 22 to 25)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 26</p> <p>1 -- well, I don't know about the SCN. I can't 2 remember. 3 We also did x-ray photoelectron 4 spectroscopy or XPS. That's a surface method 5 where we can detect products of oxidative 6 degradation on the surface. 7 We also did FTIR. Again, Dr. Dunn 8 did all of these studies I know for the AMS, I 9 believe for the Boston Scientific as well. 10 Ethicon, I can't remember. It's not in my 11 report so I don't -- and Dr. Dunn did it. So I 12 don't remember what we did there. 13 Q. The purpose of the GPC testing is to 14 do what? 15 A. Measure the molecular weight. 16 Q. What does molecular weight tell you 17 in the context of oxidation? 18 A. Well, if the oxidation is 19 sufficiently severe. So oxidation comes from 20 the surface inward. If the oxidative 21 degradation is severe enough, say during 22 processing or after implantation, you could see 23 a reduction in molecular weight which can 24 correlate with reduction in ductility and</p>	<p style="text-align: right;">Page 28</p> <p>1 Q. In addition to the tests conducted on 2 the exemplar meshes, were the same tests 3 conducted on explanted meshes? 4 A. Only for one of the AMS cases. We 5 had some explanted mesh and we did XPS on that 6 mesh. 7 Q. For what purpose did you conduct XPS 8 testing on the AMS explanted mesh? 9 A. To identify the presence of carbonyl 10 and hydroxyle groups similar to the exemplars. 11 Q. When you tested the explanted mesh 12 from AMS, was it necessary to prepare that mesh 13 explant for testing? 14 A. The preparation of the explant was 15 done by Dr. Iakovlev, who is at the University 16 of Toronto. 17 Q. Did you or Dr. Dunn have any 18 involvement in consulting with Dr. Iakovlev 19 about the preparation of the explant for XPS 20 testing? 21 A. We did. 22 Q. And tell me about your conversations 23 with Dr. Iakovlev about the appropriate way to 24 prepare this sample for analysis.</p>
<p style="text-align: right;">Page 27</p> <p>1 embrittlement. So that was the GPC 2 measurement. 3 Q. For what purposes did you take the 4 photographs by light microscopy? 5 MR. JACKSON: Object to the form. 6 A. Just a visual representation of the 7 mesh. 8 Q. (By Mr. Thomas) For what purpose was 9 the XPS testing conducted? 10 A. The purpose of the XPS was to look 11 for carbonyl and hydroxyle groups on the 12 surface which are products of oxidative 13 degradation. 14 Q. What is FTIR? 15 A. Fourier transform infrared 16 spectroscopy. 17 Q. And I believe you testified that 18 Dr. Dunn conducted FTIR testing on both AMS and 19 Boston Scientific meshes? 20 A. I believe that he did, but I'm more 21 confident in the XPS data because that's what I 22 specifically used in my reports. Dr. Dunn can 23 speak to all the testing that was done. Those 24 were all done by him.</p>	<p style="text-align: right;">Page 29</p> <p>1 A. Well, we had it shipped to us wet. 2 Dr. Iakovlev -- 3 Q. Let me stop you there. When you say 4 shipped wet, what do you mean by that? 5 A. It was in buffer, I believe, saline 6 buffer. I can't remember the details. 7 Q. Was the mesh when you received wet in 8 Formalin? 9 A. No, I don't think so. 10 Q. Was there a reason why you did not 11 want it in Formalin? 12 A. Well, some of Dr. Iakovlev's samples 13 were processed in Formalin for histology. Now 14 formalin is compatible with polypropylene. It's 15 known that you can look it up. Dr. Iakovlev 16 has run controls on pristine meshes, but we 17 felt for this purpose to have it in saline 18 would introduce less questions regarding the 19 analysis. 20 Q. Why did you use saline instead of 21 Formalin? 22 A. Saline is typical physiological. 23 It's a buffer that's used often to mimic body 24 fluids.</p>

8 (Pages 26 to 29)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 30</p> <p>1 Q. What concerns did you have about any 2 impact Formalin may have on the sample that you 3 were going to test? 4 A. We didn't have any concerns because 5 polypropylene and Formalin are compatible. 6 Q. At the time that you analyzed the 7 mesh explant from AMS that you had shipped in 8 saline, did you analyze the extent to which 9 Formalin would interact with proteins on the 10 surface of the mesh explant? 11 A. No. Dr. Iakovlev desiccated the 12 explants manually, from what I remember. He 13 removed extra tissue that he could find and 14 then shipped them to us dry for the XPS 15 testing. 16 Q. I'm sorry. I misunderstood your 17 answer. I thought you told me a minute ago 18 that you received the mesh explant wet. 19 A. Dr. Iakovlev did. He received the 20 mesh explant from the hospital. He prepared 21 the sample for XPS and then shipped it to us 22 dry after he had removed the tissue from the 23 sample. 24 Q. I see. Did -- how did Dr. Iakovlev</p>	<p style="text-align: right;">Page 32</p> <p>1 Dr. Dunn has been handling those types of 2 requests. 3 Q. Going back to the AMS explant you and 4 Dr. Dunn analyzed, you said you conducted XPS 5 testing. Any other testing you conducted on 6 that AMS explant? 7 A. No. I mean, the amount of sample is 8 very small. Dr. Dunn may have done -- he may 9 have done FTIR. I can't remember. But I think 10 the samples are very small. That's one 11 advantage of XPS, is that we can probe a very 12 small surface. 13 So to my knowledge, what I can 14 remember is we only did XPS on those. 15 Q. What was the goal of conducting the 16 testing on the AMS explanted mesh? 17 A. It was to look for presence of 18 hydroxyle and carbonyl groups on the surface 19 that are associated with polypropylene 20 degradation. 21 Q. And what do the hydroxyle and 22 carbonyl groups tell you if you find them on 23 these explanted meshes? 24 MR. JACKSON: Object to the form.</p>
<p style="text-align: right;">Page 31</p> <p>1 clean the sample? 2 A. I can't remember the details. It was 3 a different case, so I didn't review this. So 4 how much detail again should I -- 5 MR. JACKSON: If you can, answer the 6 question. 7 A. In this case, I really can't remember 8 exactly how he -- he did it. I know that he 9 had some mesh samples that he had scraped and 10 some that he had manually dissected just to 11 remove the tissue. But it was all done in 12 things like saline or dry. 13 To my knowledge, I can't remember any 14 processing of Formalin. But I'm going on my 15 memory, and it was a different case. 16 Q. All right. Was there any effort to 17 test explanted meshes from the Boston 18 Scientific litigation? 19 A. I'm not sure what you mean by "any 20 effort." We didn't have the explant, so we 21 couldn't do it. 22 Q. Did you request explants from Boston 23 Scientific to conduct tests? 24 A. I believe we did. But then again,</p>	<p style="text-align: right;">Page 33</p> <p>1 A. Well, you can do a similar approach 2 using FTIR that's in the literature where it 3 tells you that -- polypropylene is a 4 hydrocarbon. So there shouldn't be any 5 carbonyl and hydroxyle groups. So if you see 6 these species, it's an indication of oxidation 7 of the surface. 8 This has been done by FTIR, also, in 9 the past. But XPS, we believe, is more 10 sensitive. 11 Q. More sensitive than what? 12 A. FTIR. 13 Q. In what respect is XPS more sensitive 14 than FTIR? 15 A. XPS gives atomic percents, so percent 16 carbon, percent oxygen, percent nitrogen. And 17 it also provides details about the state of the 18 bonding. So it can tell you whether there's 19 bound oxygen on the surface. 20 Q. Why wasn't GPC testing conducted on 21 the AMS mesh explant? 22 A. There wasn't enough material, and GPC 23 takes quite a bit more material. 24 Q. In the hierarchy of tests, it</p>

9 (Pages 30 to 33)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 34</p> <p>1 provides you helpful information to understand  2 the extent to which degradation may have  3 occurred, where does GPC fit?  4 MR. JACKSON: Object to the form.  5 A. Well, I believe the GPC would be  6 below XPS in priority because GPC is a bulk  7 measurement. XPS is a surface measurement.  8 Oxidative degradation proceeds from the surface  9 inward. So XPS is going to provide more  10 detailed information.  11 Q. (By Mr. Thomas) How does GPC compare  12 to FTIR?  13 A. FTIR is also a method primarily for  14 looking at the oxidized species on the surface.  15 GPC is measuring the bulk molecular weight of  16 the polymer.  17 Q. Which is more sensitive, FTIR or GPC?  18 A. I don't know if I could answer that.  19 They measure different things. GPC measures  20 molecular weight and FTIR is measuring chemical  21 composition.  22 Q. Is it fair to understand that a  23 molecular weight analysis is going to be more  24 accurate than an FTIR analysis to understand</p>	<p style="text-align: right;">Page 36</p> <p>1 happening at earlier time points before you  2 have a lot of molecular weight loss, and then  3 GPC would actually measure that loss in  4 molecular weight. So it's measuring something  5 different.  6 Q. Do you agree with this statement: A  7 molecular weight analysis is really going to be  8 more accurate, I think, than to try to look for  9 degradation than with the FTIR for these  10 explanted meshes?  11 A. It depends on the context of the  12 statement. I mean -- like I said, GPC is going  13 to tell you whether there's a loss of molecular  14 weight in the material. FTIR -- the problem  15 with FTIR is it could be looking at -- you  16 can't interpret it as directly as XPS in terms  17 of the source of the carbonyl or the hydroxyle  18 groups. And it has to be fairly far along in  19 the degradation before you can see it.  20 Q. What has to be fairly far along in  21 the degradation before you can see it? I  22 didn't understand your answer. I'm sorry.  23 A. Well, I'm saying that FTIR, I think  24 is -- XPS, you can see what's happening, I</p>
<p style="text-align: right;">Page 35</p> <p>1 the extent to which polypropylene is degraded?  2 A. I wouldn't agree with that -- the  3 only way you could support that statement is if  4 you could measure GPC of that actual degraded  5 layer. But, again, that's going to be  6 difficult.  7 GPC is essentially a volume average  8 over the entire fiber. So it doesn't really  9 tell you what's going on on the surface because  10 it's averaged over the entire volume.  11 Q. Have you ever testified that  12 molecular weight analysis is more sensitive to  13 look at degradation than FTIR?  14 A. They measure different things. So  15 GPC measures molecular weight. FTIR measures  16 the surface composition. And FTIR is, I don't  17 think is, as sensitive as XPS, but they just  18 measure different things.  19 I think GPC is an important  20 measure -- if you see degradation by GPC, that  21 means it's even -- it's fairly degraded, if  22 you're seeing loss in molecular weight.  23 But I wouldn't use the word  24 sensitive. I would say XPS can tell you what's</p>	<p style="text-align: right;">Page 37</p> <p>1 believe, at earlier time points than you could  2 with FTIR because the peaks aren't always as  3 resolved as well. XPS is, I think more precise.  4 Q. So is it your position that XPS is  5 the best test method to understand the extent  6 to which oxidation occurs on the surface of  7 explanted meshes?  8 A. I would say that XPS can -- I think  9 the advantage of XPS is it can predict what's  10 happening at very early time points before  11 there's molecular weight loss.  12 Molecular weight loss happens later  13 in the process. Those carbonyl and hydroxyle  14 groups will form on the surface earlier. So  15 GPC is very effective for measuring molecular  16 weight loss. I think what I'm saying here is  17 that XPS can predict those events at very early  18 time points before there's molecular weight  19 loss. That's what I'm saying.  20 Q. What kind of equipment is necessary  21 to conduct XPS testing?  22 A. Well, there's a specific instrument  23 in XPS that's a high vacuum device. So you  24 have to -- it's a fairly expensive instrument.</p>

10 (Pages 34 to 37)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 38</p> <p>1 Q. And how is that test conducted?</p> <p>2 MR. JACKSON: Object to the form.</p> <p>3 A. Dr. Bridget Rogers at Vanderbilt did</p> <p>4 the XPS testing. That's her area of expertise.</p> <p>5 The actual details of how the test is</p> <p>6 performed, she would be -- she's the one that</p> <p>7 did the testing for this. I basically talked</p> <p>8 with her about interpretation of the data.</p> <p>9 Q. (By Mr. Thomas) Okay. How is XPS</p> <p>10 testing different from EDX testing?</p> <p>11 A. Well, EDX, in my understanding, is</p> <p>12 more like SCM where you would look for specific</p> <p>13 atoms in the background. But my understanding</p> <p>14 is that XPS is more sensitive than EDX. That's</p> <p>15 why we did XPS.</p> <p>16 Q. Did you conduct any EDX testing on</p> <p>17 any of the meshes you analyzed?</p> <p>18 A. Not to my knowledge, but Dr. Dunn</p> <p>19 would be able to speak to that.</p> <p>20 Q. The reason why you and Dr. Dunn</p> <p>21 conducted the tests that you did on the AMS and</p> <p>22 Boston Scientific meshes was to understand the</p> <p>23 extent to which these meshes may undergo</p> <p>24 oxidative degradation?</p>	<p style="text-align: right;">Page 40</p> <p>1 search?</p> <p>2 A. So I've conducted my own literature</p> <p>3 search on -- I have done my own searches for</p> <p>4 oxidative degradation of polypropylene.</p> <p>5 For the internal documents, we were</p> <p>6 provided with documents by the attorneys. We</p> <p>7 didn't have access to those through literature.</p> <p>8 Q. Is it fair to understand, though,</p> <p>9 specifically for the Ethicon mesh, that you</p> <p>10 didn't conduct an internal -- strike that.</p> <p>11 Is it fair to understand with respect</p> <p>12 to the Ethicon mesh that you didn't conduct a</p> <p>13 new literature search about the oxidative</p> <p>14 effects on polypropylene?</p> <p>15 A. Not for specific Ethicon products. I</p> <p>16 was focusing more on the mechanisms of</p> <p>17 oxidative polypropylene in general.</p> <p>18 Q. As a part of your work and your</p> <p>19 opinions in this case, did you ever focus on</p> <p>20 the mechanisms of oxidation of polypropylene</p> <p>21 for Ethicon products specifically?</p> <p>22 A. Could you repeat that?</p> <p>23 Q. Doctor, you testified -- strike that.</p> <p>24 Doctor, in the course of your work in this</p>
<p style="text-align: right;">Page 39</p> <p>1 A. Yes. We were looking for evidence of</p> <p>2 oxidative degradation. The advantage of XPS is</p> <p>3 that you can see what's happening at early time</p> <p>4 points, and it doesn't require a lot of</p> <p>5 sampling. And you can probe the surface with</p> <p>6 it. That's really the advantages of it.</p> <p>7 Q. Okay. Dr. Guelcher, go back to a</p> <p>8 month ago or so when you were first contacted</p> <p>9 by Dr. Dunn about your work in this case, and</p> <p>10 you had this conversation with Dr. Dunn you</p> <p>11 just told me about, and you decided what work</p> <p>12 you were going to do and you didn't have any</p> <p>13 exemplars and you didn't have any explanted</p> <p>14 meshes. What did you do to acquaint yourself</p> <p>15 with the Ethicon product?</p> <p>16 MR. JACKSON: Object to the form.</p> <p>17 A. We reviewed papers on it, internal</p> <p>18 documents, published papers describing the</p> <p>19 product.</p> <p>20 Q. (By Mr. Thomas) Are all the</p> <p>21 documents that you reviewed to familiarize</p> <p>22 yourself with the product in Exhibits 2 and 3?</p> <p>23 A. Yes.</p> <p>24 Q. Did you conduct your own literature</p>	<p style="text-align: right;">Page 41</p> <p>1 case, did you ever analyze the extent to which</p> <p>2 Ethicon mesh specifically degrades?</p> <p>3 A. There was some internal documents</p> <p>4 that there were references in one of these is</p> <p>5 addressed in the rebuttal report. We just</p> <p>6 received a document.</p> <p>7 There was a 1987 study. There was a</p> <p>8 human study and a study in dogs that were done</p> <p>9 by Ethicon that discussed oxidative degradation</p> <p>10 of polypropylene. These were with Prolene</p> <p>11 sutures, I believe, and not the mesh. It was</p> <p>12 the sutures.</p> <p>13 Q. Other than the internal documents</p> <p>14 that you described, did you conduct any</p> <p>15 investigation to determine the mechanism of any</p> <p>16 oxidative degradation that Prolene mesh</p> <p>17 undergoes?</p> <p>18 A. Not specific to Prolene. I think in</p> <p>19 some of the literature studies, Prolene or TVT</p> <p>20 Ethicon meshes were reviewed. But it's</p> <p>21 polypropylene, so we were focusing really on</p> <p>22 the oxidation of the polypropylene molecule.</p> <p>23 Q. What did you do in formation of your</p> <p>24 opinions in this case to understand the history</p>

11 (Pages 38 to 41)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 42</p> <p>1 of Prolene?</p> <p>2 A. I reviewed the documents that are in</p> <p>3 the reference materials.</p> <p>4 Q. Do you know how long Prolene has been</p> <p>5 in the market?</p> <p>6 A. I believe since the 1960s.</p> <p>7 Q. Do you know the application for</p> <p>8 Prolene since the 1960s?</p> <p>9 A. I know it's used in sutures and</p> <p>10 hernia mesh and in the pelvic floor meshes.</p> <p>11 Q. Do you know how Prolene happened to</p> <p>12 be introduced as a medical device in the 1960s?</p> <p>13 A. I don't remember the history of that.</p> <p>14 Q. Are you familiar with a term known as</p> <p>15 a new drug application, NDA?</p> <p>16 A. That's a regulatory term, I presume.</p> <p>17 Q. What's your understanding of what a</p> <p>18 new drug application is?</p> <p>19 A. I don't know that I'm familiar with</p> <p>20 the new drug application. My work is more in</p> <p>21 devices where we're dealing with PMAs and</p> <p>22 510Ks. And a new drug application I'm not as</p> <p>23 familiar with.</p> <p>24 Q. What's your general understanding of</p>	<p style="text-align: right;">Page 44</p> <p>1 Q. I'll get it here in a minute. No</p> <p>2 problem.</p> <p>3 Were those the only two studies</p> <p>4 you've looked at to understand specifically the</p> <p>5 testing done by Ethicon on the safety and</p> <p>6 efficacy of the polypropylene used in Prolene</p> <p>7 since its introduction in the '60s?</p> <p>8 A. There was a 17-year study done by</p> <p>9 Nielson published about maybe 2011, I think,</p> <p>10 2013.</p> <p>11 Q. You've opened your book.</p> <p>12 A. That's this one.</p> <p>13 Q. You obviously have that in your</p> <p>14 notebook there?</p> <p>15 A. Yes.</p> <p>16 Q. I didn't see that referenced in your</p> <p>17 report. For what purpose did you look at the</p> <p>18 17-year Nielson study?</p> <p>19 A. Well, it was a long-term study on the</p> <p>20 TVT device, not the TVT-O but the TVT device.</p> <p>21 Q. Do you understand that the mesh used</p> <p>22 in the Nielson study for the 17-year data</p> <p>23 that's contained in that study is the same mesh</p> <p>24 that's used in TVT-O?</p>
<p style="text-align: right;">Page 43</p> <p>1 what that is, to the extent that you have one?</p> <p>2 A. I would presume that when a company</p> <p>3 develops a new drug, they submit a new drug</p> <p>4 application. But that specific term, I don't</p> <p>5 know the details of it.</p> <p>6 Q. In learning about the polypropylene</p> <p>7 used in Prolene, did you review any of the</p> <p>8 testing conducted by Ethicon since the 1960s in</p> <p>9 connection with the safety and efficacy of the</p> <p>10 polypropylene used in Prolene?</p> <p>11 A. Primarily, the dog study and human</p> <p>12 study were the primary documents that I</p> <p>13 reviewed.</p> <p>14 Q. And the dog study would be the</p> <p>15 seven-year dog study?</p> <p>16 A. The seven-year dog study published in</p> <p>17 1992.</p> <p>18 Q. What was the human study you referred</p> <p>19 to?</p> <p>20 A. I wouldn't call it a human study. It</p> <p>21 was sutures explanted from vascular grafts in</p> <p>22 human patients. That one was done in 1987.</p> <p>23 Q. That must be in your rebuttal report?</p> <p>24 A. It is.</p>	<p style="text-align: right;">Page 45</p> <p>1 A. Yes.</p> <p>2 Q. Are you able in your area of</p> <p>3 expertise to use the results from the Nielson</p> <p>4 study that you have in front of you? Can you</p> <p>5 transfer those to TVT-O?</p> <p>6 MR. JACKSON: Object to the form.</p> <p>7 A. There are differences in my</p> <p>8 understanding between TVT and TVT-O in the</p> <p>9 approach and the instruments.</p> <p>10 The mesh is the same, is also</p> <p>11 polypropylene. But whether or not you can</p> <p>12 translate this to TVT-O, I don't know. I'm not</p> <p>13 a surgeon. But I know it's also polypropylene</p> <p>14 mesh.</p> <p>15 Q. Of what significance to you is the</p> <p>16 Nielson study that you have in front of you,</p> <p>17 the 17-year data?</p> <p>18 A. Well, it's not that many patients and</p> <p>19 they -- a fraction of them, they followed --</p> <p>20 maybe 60 percent they followed out to 17 years.</p> <p>21 One of them had a complication, an erosion.</p> <p>22 But I think it's just another piece of data.</p> <p>23 I mean, Dr. Nielson is -- I think it</p> <p>24 says in the back here that he's a consultant</p>

12 (Pages 42 to 45)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 46</p> <p>1 for Ethicon. So, you know, he has interest in  2 success of the material. It's one study done  3 by a clinician who is pretty connected to the  4 material.  5 Q. Do the findings in the Nielson study,  6 the 17-year data support your opinions in this  7 case?  8 MR. JACKSON: Object to the form.  9 A. There was an erosion in one of the  10 meshes that would be consistent with my opinion  11 that polypropylene undergoes surface oxidation  12 which leads to embrittlement, can lead to  13 erosion and other types of complications.  14 Q. There's nothing in that study to  15 suggest that there's degradation involved in  16 the one erosion that's there, is there?  17 A. I don't think they looked at that.  18 Q. Is that the only point in the Nielson  19 study upon which you rely to support your  20 opinions, the fact that an erosion occurred?  21 A. There wasn't a lot of -- I mean, the  22 examinations that these women received, some of  23 them they talked to over the phone. It was a  24 quality-of-life survey in older women. So to</p>	<p style="text-align: right;">Page 48</p> <p>1 mesh or suture in connection with your opinions  2 in the case?  3 A. I believe so. Well, yeah, for  4 specific -- yes, I believe so, for specific  5 Ethicon products that I can remember.  6 Q. Right. Dr. Guelcher, have you ever  7 used the term "gold standard"?  8 A. I think a lot of people use this  9 term. It can apply to a lot of -- it depends  10 on the context of what you mean.  11 Q. How do you use the term "gold  12 standard" in your work?  13 A. I don't think I use it very much. It  14 can be used in the context of almost like a  15 clinical control. So in my work in bone  16 grafting, a lot of people refer to autograft  17 bone as the gold standard. It's the most  18 successful approach for healing bone.  19 That doesn't necessarily mean it's  20 preferred or the best way to do it. It's just  21 what's known to be the most effective. So  22 autograft bone has its deficiencies. People  23 still refer to it as the gold standard because  24 it's the best known approach basically.</p>
<p style="text-align: right;">Page 47</p> <p>1 me, it's a bit difficult to interpret. Were  2 there other types of complications? It's hard  3 to say.  4 The data just aren't that -- they say  5 in here that a lot of the patients didn't want  6 these invasive evaluations. So it's very  7 qualitative. It's difficult for me to take  8 much away from it. It's just another piece of  9 information.  10 Q. All I'm trying to understand is  11 you've obviously pointed this out to me as  12 something in your file that's of significance  13 to you, and I need to know the significance of  14 it to your opinions in the case.  15 A. So, I mean, I thought I answered it.  16 There was one patient had an erosion. And it's  17 difficult for me to rely heavily on this  18 document just because of the types of data that  19 was collected. It wasn't specific to the types  20 of questions that we're asking. I would say it  21 was more inconclusive, if that's what you're  22 asking.  23 Q. Okay. So have we identified now the  24 studies that you looked at specific to Ethicon</p>	<p style="text-align: right;">Page 49</p> <p>1 Q. And in the bone graft context,  2 there's no perfect bone graft procedure; fair?  3 A. Well, the problem with autograft is  4 that you have to get it from somewhere. That  5 introduces a lot of limitations. And so  6 there's a number of different approaches that  7 can be used.  8 Q. At least that is -- the autograft  9 bone procedure is known as the gold standard  10 in your area of expertise because it's the  11 best that you-all have available at this  12 time; is that fair?  13 A. That's the way a lot of -- I think  14 that's -- I mean, understanding within the  15 field is that autograft is the gold standard  16 in terms of healing.  17 Q. Have you made any investigation to  18 determine the extent to which the use of  19 polypropylene in tissue repair has been  20 considered the gold standard since the '60s?  21 A. Well, I don't know that I would agree  22 with that statement. I think some of Ethicon's  23 own documents and e-mails say that they're  24 moving toward these PVDF meshes because the</p>

13 (Pages 46 to 49)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 50</p> <p>1 inflammatory response is less severe.  2 Q. My question is very simple: Have you  3 made any investigation to determine the extent  4 to which polypropylene has been considered the  5 gold standard in tissue repair since the 1960s?  6 A. Well, I think I just said other  7 people may consider it the gold standard. I  8 looked into these documents, and I don't  9 consider it the gold standard. It's an  10 unstable material in my opinion.  11 It may have been the best one  12 available in 1960, but I think recent evidence  13 points to the contrary that there are  14 alternative materials available.  15 I think even Ethicon's own e-mails  16 there are statements that we need to move to a  17 different material because of problems with  18 polypropylene.  19 Q. And what material -- do you have an  20 opinion that there's a better material than  21 polypropylene in the treatment of stress  22 urinary incontinence?  23 A. That opinion really wasn't the  24 subject of my report. I can say that in the</p>	<p style="text-align: right;">Page 52</p> <p>1 Q. Are you referring to Ethicon  2 documents now?  3 A. Yes.  4 Q. Are you looking at the seven-year dog  5 study?  6 A. I am. So they were looking at  7 alternatives. One of the alternatives was  8 Ethylon, Novafil, Prolene, and they point out  9 that -- let me look at this for a minute.  10 So in this dog study, some of the  11 dogs were implanted with PTVF sutures in 1987,  12 and I believe that -- so this report is  13 basically saying PVF and Novafil did not show  14 the surface cracks and surface oxidation that  15 Prolene was showing. So this would be 1992, I  16 think this was published. Yeah.  17 Q. Is it your understanding that the  18 Ethicon dog study was published?  19 A. I mean published internally. It  20 looks like it's an internal report to me.  21 That's what I meant by published. Submitted, I  22 should say.  23 Q. Doctor. Is there any significance to  24 your opinions in this case, whether you are</p>
<p style="text-align: right;">Page 51</p> <p>1 documents that I reviewed, there were Ethicon  2 employees and I believe even consultants  3 pointing out that PVDF, for example -- there  4 are some papers that have pointed out that PVDF  5 would be a better choice, but I didn't look at  6 that specifically in my report.  7 Q. Do you know what PVDF is?  8 A. Polyvinylidene fluoride.  9 Q. Have you ever studied the use of  10 polyvinylidene fluoride in the context of  11 tissue repair?  12 A. No. Like I said, that's outside the  13 context of my report. I'm just noting that  14 even Ethicon employees are doubting this notion  15 that polypropylene is the only thing available.  16 Q. Do you know of any PVDF mesh  17 available for sale in the United States?  18 A. No. It would require another  19 regulatory filing.  20 Q. Now, at what point, to your  21 knowledge, was PVDF available as an  22 alternative?  23 A. I believe -- let me look at the  24 document.</p>	<p style="text-align: right;">Page 53</p> <p>1 looking at Prolene that's sutured or Prolene in  2 mesh, in terms of the oxidative degradation  3 issues?  4 A. Well, there's a number of comments in  5 the internal Ethicon documents about moving  6 from heavy-weight to light-weight mesh, the  7 notion being just having less polypropylene has  8 been associated with a reduced inflammatory  9 response.  10 Mesh is different than sutures. It's  11 implanted in a different anatomic site where  12 there could be differences in load-bearing.  13 There could be differences in the cellular  14 infiltrate. There's many types of differences.  15 So I don't know that -- you can learn  16 some things from the suture studies, but it's  17 not necessarily representative of how much  18 degradation you would see in a mesh. I would  19 think you would see more in a mesh.  20 Q. Why?  21 A. Because there's more polypropylene  22 there. It's -- especially in the pelvic floor,  23 it's bearing a load, so it's under a different  24 types of stresses and strains. So the</p>

14 (Pages 50 to 53)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 54</p> <p>1 consequences of those, oxidative degradation 2 could be different in a mesh than you would see 3 in a suture. 4 Q. Are your opinions in this case 5 specific to meshes? 6 A. Well, I think my opinions relate to 7 oxidative degradation of polypropylene and then 8 how that can affect the mesh. That's my -- 9 Q. I understand that. But are your 10 opinions in this case specific to meshes and 11 not sutures? 12 A. Yes. I'm not here to testify about 13 polypropylene sutures. I was looking at the 14 suture studies because it was the data that was 15 available to evaluate the body's response to 16 polypropylene. 17 Q. And are your opinions in this case 18 specific to the polypropylene mesh used for the 19 treatment of stress urinary incontinence? 20 MR. JACKSON: I'm going to object to 21 form. 22 A. So, again, my opinions are generally 23 to oxidative degradation of polypropylene and 24 how that can affect its performance in the SUI</p>	<p style="text-align: right;">Page 56</p> <p>1 Is there any material that can be used for 2 medical implants that can be considered inert? 3 A. Some are less active than others. I 4 don't know if it's anything that's completely 5 inert. 6 Q. You continue and say, It's often 7 stabilized against the threat of oxidation by 8 adding antioxidants to the molten polymer. 9 These antioxidants are supposed to act as 10 scavengers that will react with any oxidative 11 species. 12 Do you know how, if at all, Ethicon 13 stabilized Prolene against the threat of 14 oxidation by adding antioxidants? 15 A. So there's some information in the 16 internal documents I know they made some 17 changes to stabilizer levels. The stabilizer 18 levels that I saw were reported as ranges. 19 In the 1987 human explants, it was 20 noted that the antioxidant was depleted in the 21 surface oxidized layer on the polypropylene. 22 My understanding was the oxidants 23 were added to protect against oxidation during 24 thermal processing. But to dose an antioxidant</p>
<p style="text-align: right;">Page 55</p> <p>1 application. 2 Q. (By Mr. Thomas) You've not looked at 3 the extent to which oxidative degradation of 4 polypropylene can impact the performance of 5 Prolene in other applications? 6 A. Like hernia or something? 7 Q. Correct. 8 A. That's not what I'm saying in the 9 report or testifying to. It's the meshes and 10 the SUI. 11 MR. JACKSON: We've been going for 12 about a hour. Do you think it's time for a 13 break? 14 MR. THOMAS: That's fine. 15 (A break was taken from 10:26 a.m. 16 until 10:39 a.m.) 17 Q. (By Mr. Thomas) Doctor, I want to 18 move to your report which we've marked as 19 Exhibit No. 1. 20 A. Okay. 21 Q. Go to page 4 of your report, please. 22 The second paragraph on page 4, you talk 23 about -- you make the statement, Although 24 polypropylene can never be considered inert.</p>	<p style="text-align: right;">Page 57</p> <p>1 over the lifetime of the device in vivo would 2 be -- I don't know if that can be done. That's 3 what I'm saying in this paragraph. 4 Q. What did Ethicon do to stabilize its 5 polypropylene against oxidation? 6 A. In the human study -- not the human 7 study. The human explanted materials, they 8 were using -- 9 Q. I need you to identify what you're 10 reading now. 11 A. Oh, this is the report issued on 12 human explants from human vascular graft, 13 Prolene sutures removed from human vascular 14 graft. 15 MR. JACKSON: Is there a Bates number 16 at the bottom of that? 17 THE WITNESS: Ethicon mesh 12831391. 18 Q. (By Mr. Thomas) It's dated September 19 30, 1987? 20 A. Yes. 21 Q. And it's an Ethicon document? 22 A. Yes. 23 Q. It says, IR microscopy of explanted 24 Prolene received from professor R. Guidoin?</p>

15 (Pages 54 to 57)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 58</p> <p>1 A. Yes.</p> <p>2 Q. When did you first see those</p> <p>3 documents?</p> <p>4 A. Yesterday, I believe.</p> <p>5 Q. And how did you obtain those</p> <p>6 documents?</p> <p>7 A. Dr. Dunn asked for this document, I</p> <p>8 believe. I got it from him. I believe he</p> <p>9 asked the attorneys for it.</p> <p>10 Q. And what does --</p> <p>11 A. You asked about the antioxidants.</p> <p>12 Q. Correct.</p> <p>13 A. I believe that this report -- I need</p> <p>14 to find it. Dilauryl thiodipropionate, DLTDP,</p> <p>15 is what I believed -- I believe they were using</p> <p>16 this as antioxidant in the suture at this time.</p> <p>17 It appears reduced in the two-year sample</p> <p>18 spectra and further reduced in the eight-year</p> <p>19 sample spectra. And in the material they</p> <p>20 scraped off the surface, they did not find any</p> <p>21 of it. That's what the report says.</p> <p>22 Q. Okay. Just for the record, that's</p> <p>23 marked as document No. 18?</p> <p>24 A. Yes.</p>	<p style="text-align: right;">Page 60</p> <p>1 documents -- I guess there are 20 documents</p> <p>2 in a notebook which we've marked earlier as</p> <p>3 Exhibit No. 3.</p> <p>4 (Exhibit 5 was marked.)</p> <p>5 Q. (By Mr. Thomas) Those 20 documents</p> <p>6 are the documents upon which you rely for the</p> <p>7 substance of your rebuttal report, Exhibit 5?</p> <p>8 MR. JACKSON: Object to the form.</p> <p>9 A. Well, the rebuttal report also</p> <p>10 includes the documents submitted. The rebuttal</p> <p>11 report also includes documents in the first</p> <p>12 report.</p> <p>13 Q. Okay. But the new documents for the</p> <p>14 rebuttal report are contained in the notebook,</p> <p>15 Exhibit 3, that you brought here with you this</p> <p>16 morning?</p> <p>17 MR. JACKSON: Object to the form.</p> <p>18 A. I believe that they are.</p> <p>19 Q. (By Mr. Thomas) Other than document</p> <p>20 No. 18 in Exhibit No. 3, do you have any other</p> <p>21 documents to support your opinion that the</p> <p>22 antioxidants used in the Prolene mesh were not</p> <p>23 sufficient to stabilize against the threat of</p> <p>24 oxidation?</p>
<p style="text-align: right;">Page 59</p> <p>1 Q. In Exhibit No. 3; is that right?</p> <p>2 A. Yes, that's right.</p> <p>3 Q. And you received that document</p> <p>4 yesterday. Any other documents that you</p> <p>5 received yesterday that you rely on for your</p> <p>6 opinions in the case?</p> <p>7 A. Well, they're in this notebook.</p> <p>8 Q. This is the new binder?</p> <p>9 A. Yes. So this was one that I brought</p> <p>10 with me. These are some --</p> <p>11 Q. I see.</p> <p>12 A. Most of this I got from Dr. Dunn. He</p> <p>13 had requested a number of these documents, and</p> <p>14 he got them from attorneys and we reviewed them</p> <p>15 yesterday.</p> <p>16 Q. I see. So the documents in Exhibit</p> <p>17 No. 3 go with the rebuttal report that you were</p> <p>18 served yesterday?</p> <p>19 A. They do, yeah.</p> <p>20 MR. THOMAS: For the record, I'm</p> <p>21 going to mark as Exhibit No. 5 -- Exhibit</p> <p>22 No. 5 is an expert rebuttal report from</p> <p>23 Scott Guelcher, Ph.D., that I received for</p> <p>24 the first time this morning. And the</p>	<p style="text-align: right;">Page 61</p> <p>1 A. This is the only document that has</p> <p>2 the in vivo analysis of that.</p> <p>3 Q. Okay. Going back to my original</p> <p>4 question, what did you do to understand how</p> <p>5 Ethicon used antioxidants to stabilize Prolene</p> <p>6 against the threat of oxidation?</p> <p>7 A. So Dr. Dunn was looking at this more</p> <p>8 in his report. I discussed this topic with</p> <p>9 Dr. Dunn. He showed me some documents</p> <p>10 providing ranges of the antioxidant that were</p> <p>11 provided.</p> <p>12 There were some changes made to the</p> <p>13 antioxidant levels as well. I'm not sure that</p> <p>14 we were able to identify what those were. But</p> <p>15 I do believe there were some documents stating</p> <p>16 that the antioxidant levels were changed, but</p> <p>17 Dr. Dunn was looking at that. I discussed it</p> <p>18 with him.</p> <p>19 Q. Do you have an opinion that you're</p> <p>20 prepared to offer to a reasonable degree of</p> <p>21 scientific certainty that the antioxidant</p> <p>22 package used by Ethicon for Prolene is</p> <p>23 inadequate to protect against oxidation in</p> <p>24 vivo?</p>

16 (Pages 58 to 61)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 62</p> <p>1 A. My opinion is that the antioxidant 2 used cannot protect against oxidation in vivo. 3 I believe that because of the teachings of Jim 4 Anderson that this chronic inflammatory 5 response foreign body reaction is ongoing and 6 will continue to oxidize material and deplete 7 the antioxidant. 8 That observation is basically 9 supported by these studies on the sutures from 10 the human explants and, you know, consistent, I 11 think, with the field that you simply can't 12 protect a device over its lifetime. It's going 13 to be implanted in a patient over the patient's 14 lifetime with an antioxidant. Eventually, it 15 will be depleted. 16 Q. Can you tell me today what the 17 antioxidant package that Ethicon used to 18 protect the Prolene polypropylene from 19 oxidation was? 20 A. I don't know what it is today. In 21 this report in 1987, it was DLTPD. 22 Q. Is that all it was? 23 A. That's what it says in this report. 24 Q. Have you tried to determine the</p>	<p style="text-align: right;">Page 64</p> <p>1 to be very difficult. No matter what 2 antioxidant is added, it's going to be 3 gradually depleted over time. 4 Q. What's the basis for your opinion 5 that whatever antioxidant is available is going 6 to be depleted over time? 7 A. Well, the paper by Jim Anderson and 8 other papers that have shown that this foreign 9 body reaction is continuous and ongoing and 10 it's going to continue as long as the material 11 is there. Eventually, that antioxidant is 12 going to be depleted. 13 I suppose you could put it in at very 14 high doses, but then you're going to have 15 toxicity concerns. To my knowledge, nobody has 16 studied that, what's the amount of antioxidants 17 to add to protect it over its lifetime. 18 Q. Is it your opinion that the 19 antioxidant package Ethicon used is inadequate 20 or that it can't be done? 21 A. Well, my opinion is that the 22 antioxidant used in 1987 is inadequate. That 23 opinion is supported by Ethicon's own data. 24 I don't know what -- I don't remember</p>
<p style="text-align: right;">Page 63</p> <p>1 specific antioxidant package Ethicon used to 2 stabilize Prolene against the threat of 3 oxidation? 4 A. Dr. Dunn and I looked at this. Like 5 I said, our conclusion was that the documents 6 provided a range of antioxidant. It didn't 7 provide a specific dose. 8 Q. Can you tell me today as you sit here 9 in this chair the antioxidant package Ethicon 10 used to stabilize Prolene against the threat of 11 oxidation? 12 A. I don't remember what it was. 13 Q. Is it your opinion, Doctor, that 14 there is no antioxidant package available that 15 can effectively stabilize polypropylene against 16 the threat of oxidation? 17 A. I don't believe it's possible to 18 stabilize an implant against oxidation over its 19 entire lifetime. I don't know that there's 20 much data on what the dosing should be. If 21 it's dosed too high, that could cause problems. 22 There's papers that have noted that. 23 The problem is it's an inherently 24 unstable material, and stabilizing it is going</p>	<p style="text-align: right;">Page 65</p> <p>1 what the antioxidant is that's being used 2 today, but my opinion would be that that would 3 also be inadequate. Over time, it's just going 4 to be depleted and you can't guarantee that 5 it's going to stay there. 6 Q. Okay. And the same would be true for 7 any polypropylene used as a medical device; 8 fair? 9 MR. JACKSON: Objection to form. 10 A. I don't believe polypropylene can be 11 stabilized effectively over its lifetime when 12 implanted in a human or animal. 13 Q. (By Mr. Thomas) What's the risk when 14 you're unable to stabilize the polypropylene 15 used as a medical implant over the life of the 16 implant? 17 MR. JACKSON: Object to the form. 18 A. Well, the risk is exactly what's 19 pointed to in this Ethicon study. At two 20 years, I don't believe they saw -- 21 Q. This is Tab 18 again, the Guidoin 22 study? 23 A. Yes. I need to review this again for 24 just a minute. There are a lot of documents.</p>

17 (Pages 62 to 65)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 66</p> <p>1 So I can say that as you go from two 2 to eight years, the amount of DLTP -- DLTDP was 3 reduced, and in that surface oxidized layer it 4 was gone. 5 So I think this study supports the 6 idea that stabilizing polypropylene against in 7 vivo degradation permanently for the lifetime 8 of the patient is going to be very difficult. 9 Eventually, the material will oxidize and 10 become embrittled. 11 And those are the consequences, I 12 believe, to not being stable. 13 Q. Okay. Are you aware of any study 14 published in peer-reviewed literature which 15 suggests that Ethicon Prolene loses its 16 antioxidant package such that it oxidizes and 17 becomes embrittled, as you've described it? 18 A. I'm not aware of a published study 19 that's shown that. But, then again, Ethicon's 20 internal study reported that. 21 Q. What have you done to understand the 22 circumstances of the study that's in Tab 18 of 23 Exhibit 3? 24 A. I've read the study, and then there</p>	<p style="text-align: right;">Page 68</p> <p>1 antioxidant is. 2 Q. (By Mr. Thomas) Do you know whether 3 there's more than one in 1987? 4 A. In 1987, I don't know. This report 5 just refers to DLTDP. That's -- it doesn't say 6 whether there's another one. It just talks 7 about DLTDP. 8 Q. Have you made any effort to 9 understand how Ethicon arrived at the 10 antioxidants that it uses to stabilize Prolene 11 against the threat of oxidation? 12 MR. JACKSON: Object to the form. 13 A. Again, there were a limited number of 14 references that we talked about. I believe 15 reviewing some of those documents with 16 Dr. Dunn, there was a change made in the 17 antioxidant levels, and we were trying to find 18 additional documents to explain that change, 19 why it was made. And I don't believe that was 20 successful. 21 Q. (By Mr. Thomas) Is Tab 18 in this 22 document the extent of Exhibit 3, the extent of 23 your knowledge of what you believe to be 24 depletion of the antioxidants in Prolene?</p>
<p style="text-align: right;">Page 67</p> <p>1 were some minutes that were issued to schedule 2 a meeting to -- I think at the meeting, they 3 talked about the implications of the study 4 where they were going to measure -- there was 5 concern about how deep are these surface 6 cracks. And I think Dr. Dunn was trying to 7 find additional information, SCM. We couldn't 8 find that information. So this was all we 9 could get on this particular study. 10 But there was a follow-up meeting. 11 We have some minutes from that, but we don't 12 have much additional -- they measured some 13 crack depths. But I believe it was the SCM 14 images that we didn't have. We have FTIR data 15 here for no SCM. 16 Q. Okay. Is it your opinion that the 17 DLTDP is the only antioxidant in Prolene? 18 MR. JACKSON: Objection to form. 19 A. Well, I think I've already answered 20 that. In 1987, this report refers to the DLTDP 21 stabilizer antioxidant. I can't remember what's 22 used today. I know there was a range of doses 23 in the material. That range is pretty broad. 24 But I don't remember what the current</p>	<p style="text-align: right;">Page 69</p> <p>1 A. This is the only study that I'm aware 2 of that we found that addressed the antioxidant 3 question directly. 4 Q. In your review of documents in 5 connection with this case, are you aware of any 6 other documents that you've reviewed which 7 address the depletion of antioxidants in 8 Prolene suture or Prolene mesh? 9 A. This is the only one that we could 10 find that directly addressed the antioxidant 11 question, how much antioxidant is left. 12 Q. So if I'm going to ask you the 13 question on what documents you rely to support 14 your opinion that the antioxidants in Prolene 15 suture are depleted over time, you would point 16 to Tab 18 in Exhibit 3? 17 A. Well, there's indirect information in 18 the dog study because the dog study observed 19 surface cracking that would also be a 20 consequence of oxidative degradation and 21 embrittlement. But they didn't -- I don't 22 believe in this study they actually looked at 23 the amount of antioxidant remaining. 24 Q. Anything else?</p>

18 (Pages 66 to 69)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 70</p> <p>1 A. Those are the two studies that I'm 2 aware of that looked specifically at this 3 question. 4 Q. Let's go back to your report on page 5 4 again. In the middle of the second 6 paragraph, it says, Nor is this stabilization 7 permanent. The purpose of using antioxidants 8 is to react with any oxidated species that 9 threaten the molecular structure of the 10 polypropylene chain. You cite to footnote 4, 11 but there's no footnote 4. 12 A. I'm not sure what happened there. It 13 must be an oversight. 14 Q. Do you recall the paper upon which 15 you relied for that statement? 16 A. I don't recall the paper for that 17 one. But I think the point of this statement 18 is really in my experience, antioxidants are 19 added to protect for a certain shelf life. So 20 you would add an antioxidant to protect a 21 polymer for a three-year shelf life. 22 These types of studies can be done in 23 the known. That type of dosing can be done. 24 What I'm saying is that trying to determine the</p>	<p style="text-align: right;">Page 72</p> <p>1 discussed the Anderson article. Let me hand 2 you what I've marked as deposition Exhibit 3 No. 6 and ask you if Exhibit No. 6 is the 4 Anderson study to which you've cited in your 5 paper. 6 A. Yes. 7 Q. And I believe I heard you say that 8 you cite Anderson for the proposition that over 9 the life of the material, that antioxidants 10 will be depleted. Did I hear that correctly? 11 MR. JACKSON: Object to the form. 12 A. I think what I said was this foreign 13 body reaction will continue as long as the 14 material was present. 15 Q. (By Mr. Thomas) Okay. Does the 16 Anderson article speak to the issue of the 17 extent to which antioxidants added to 18 polypropylene will be depleted over time? 19 A. Not directly. I was using Anderson 20 to support the notion that the foreign body 21 response is ongoing. 22 Q. Are there any of the studies that 23 you've cited in your report, Exhibit No. 1, 24 that support the proposition that antioxidants</p>
<p style="text-align: right;">Page 71</p> <p>1 dosing to protect against in vivo degradation 2 is another question. 3 Q. Let me ask you this question: Is it 4 your belief that the antioxidants that are 5 added to Ethicon prolene polypropylene are 6 merely for shelf life consideration? 7 A. There was a statement that I read in 8 one of the documents. I can't remember which 9 one it was. But there was an Ethicon document 10 that made the statement that the stabilizer was 11 added to protect against mechanical and thermal 12 processing. 13 Q. Is it your opinion that the 14 antioxidants added to Prolene polypropylene are 15 only to extend the shelf life of that product? 16 A. The only evidence I have for the 17 purpose of adding antioxidants was to stabilize 18 it against manufacturing shelf life in the box 19 before it's implanted. I didn't see any 20 evidence in the documents that I reviewed where 21 antioxidants were added dosed for the purposes 22 of in vivo stability. 23 (Exhibit 6 was marked.) 24 Q. (By Mr. Thomas) A minute ago, you</p>	<p style="text-align: right;">Page 73</p> <p>1 added to polypropylene deplete over time and 2 create a risk of degradation? 3 A. As I said before, the only study that 4 looked at specific questions of antioxidant 5 loss would be the human explants from 1987. 6 Q. That's Tab 18 in Exhibit No. 3? 7 A. Yes. 8 (Exhibit 7 was marked.) 9 Q. (By Mr. Thomas) Let me show you 10 what's been marked as deposition Exhibit No. 7. 11 Deposition Exhibit No. 7 is a study, 1976, 12 titled Subcutaneous Implants of Polypropylene 13 Filaments, lead author Liebert. You cite this 14 in your paper, don't you? 15 A. Yes. 16 Q. This is a 1976 study that compares 17 polypropylene implanted in animals with 18 antioxidants and without antioxidants; correct? 19 A. Yes. 20 Q. The Liebert study finds that the 21 polypropylene treated with antioxidants does 22 not degrade? 23 A. In this particular study in this 24 implantation site for this period of time, they</p>

19 (Pages 70 to 73)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 74</p> <p>1 were able to protect it from degradation. Let  2 me look -- I need to look at this for a minute.  3 So they went out to an implantation  4 time of 160 days. I think that's five or six  5 months.  6 So I'm not saying that you can't  7 protect it for a period of time. I mean, even  8 the human explants showed some antioxidant  9 after eight years. I'm saying it's reduced.  10 So this is five months. But if you go out  11 years, these devices are made to be implanted  12 in humans for their lifetime.  13 If you go out for very long periods  14 of time, I don't think you can guarantee that  15 these antioxidants -- they didn't even measure  16 the anti -- I don't think they did. I would  17 have to look at it again.  18 So I'm not saying that you can't  19 protect it for some period of time. I'm just  20 saying that I doubt whether you can protect it  21 over the lifetime of the device on every  22 patient, that you can protect it from  23 oxidation. This is only five months.  24 At eight years in these sutures</p>	<p style="text-align: right;">Page 76</p> <p>1 So I see this study as being  2 consistent with Liebert. I think Liebert was  3 asking a different question. I think Liebert  4 was saying, Well, for five months, I can add  5 enough antioxidant to stabilize the  6 polypropylene. So I want to compare stabilized  7 polypropylene -- it's like a control -- versus  8 unstabilized polypropylene.  9 So Liebert was going after a  10 different question, but he just didn't go out  11 as far as this study did. So I don't really  12 see any consistencies between these two  13 studies.  14 Q. Are you aware of any studies in the  15 peer-reviewed literature that support your  16 position that stabilizers used to protect  17 against oxidation in polypropylene deplete over  18 time and create a risk of the oxidative  19 degradation of polypropylene?  20 A. There's no studies that have  21 specifically shown that. But I think from what  22 we know about the foreign body response, that  23 the oxidative attack is continuous and ongoing.  24 What we know from the human explants,</p>
<p style="text-align: right;">Page 75</p> <p>1 explanted from humans, they saw loss of  2 antioxidant.  3 Q. When you talk about the sutures at  4 eight years, again, you're talking about Tab 18  5 in Exhibit 3 of your rebuttal report?  6 A. Yes.  7 Q. So you would suggest that Tab 18 of  8 Exhibit 3, the suture study, is inconsistent  9 with the findings in Exhibit 7 in Liebert?  10 A. No. I think they're consistent.  11 Liebert only went out five months. What this  12 study is saying -- let me read the findings  13 again.  14 Q. Just for your benefit, I don't have  15 that study.  16 A. I understand.  17 Q. I'll get that, but I don't have that.  18 A. I understand that. But what this  19 study is saying is -- I need to find it.  20 So the DLTD appears reduced at two  21 years. Two years is longer than five months.  22 And at eight years, it's further reduced. And  23 then in the oxidized material that they scraped  24 off, they didn't find it.</p>	<p style="text-align: right;">Page 77</p> <p>1 initially that antioxidant is going to be  2 depleted. That's what I think we know.  3 Q. We know from your earlier testimony  4 that polypropylene has been used in tissue  5 repair for 50 years now; correct?  6 A. Yes.  7 Q. Wouldn't you expect that to be an  8 issue of significance in the medical and  9 scientific literature if polypropylene used for  10 the last 15 years loses antioxidants and poses  11 a risk to the patients?  12 A. I don't know if -- the papers I'm  13 actually familiar with that I reviewed are not  14 specifically looking at the question of  15 antioxidant depletion, but they do show signs  16 of oxidation.  17 So if there's signs of oxidation,  18 this study confirms it. And you would  19 anticipate that if it's oxidizing, the  20 antioxidant is not protecting it.  21 Q. That's something that could be  22 tested, though, couldn't it?  23 A. Well, they tested it here.  24 Q. You're talking about the Ethicon --</p>

20 (Pages 74 to 77)

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<p style="text-align: right;">Page 78</p> <p>1 A. In the human explants, yeah.</p> <p>2 Q. I'm talking about in the peer-</p> <p>3 reviewed literature to the extent that was a</p> <p>4 phenomenon going on, that was something that</p> <p>5 could be presented in a controlled scientific</p> <p>6 test that could be subject to peer-review and</p> <p>7 published in the literature?</p> <p>8 A. They should be able to do that.</p> <p>9 That's just not what those studies did. They</p> <p>10 were looking more at signs of surface oxidation</p> <p>11 like Liebert did. They were looking at the</p> <p>12 phenomenon of surface oxidation.</p> <p>13 Q. The Anderson paper that we just</p> <p>14 discussed, the Anderson paper you've cited for</p> <p>15 the proposition of the continuous foreign body</p> <p>16 reaction to the life of the explant; is that</p> <p>17 fair?</p> <p>18 A. Yes.</p> <p>19 Q. Any other purpose?</p> <p>20 A. General background on the nature of</p> <p>21 the inflammatory response that was in the</p> <p>22 report.</p> <p>23 Q. Dr. Guelcher, your education is what?</p> <p>24 A. So I have a bachelor's degree and</p>	<p style="text-align: right;">Page 80</p> <p>1 stable. But the polyethers are known to undergo</p> <p>2 oxidative degradation.</p> <p>3 Q. Is there any material of which you're</p> <p>4 aware that you could use for a medical device</p> <p>5 implant that is not subject to oxidative</p> <p>6 degradation?</p> <p>7 A. Every material is going to -- the</p> <p>8 foreign body response is going to happen when</p> <p>9 you implant a foreign material. So the</p> <p>10 difference is materials -- materials respond</p> <p>11 differently to that foreign body reaction. And</p> <p>12 I think Ethicon's data points to polymers like</p> <p>13 PVDF as being more resistant to oxidative</p> <p>14 degradation. So some are more resistant than</p> <p>15 others.</p> <p>16 Q. Are you saying that PVDF does not</p> <p>17 degrade by oxidation in vivo?</p> <p>18 A. What I'm saying is, in the dog study,</p> <p>19 the PVDF sutures didn't show evidence of</p> <p>20 surface cracking. Now, whether there's</p> <p>21 oxidative degradation, you would have to use</p> <p>22 more sensitive techniques like XPS to actually</p> <p>23 characterize a surface.</p> <p>24 At seven years in this dog study,</p>
<p style="text-align: right;">Page 79</p> <p>1 master's degree and Ph.D. in chemical</p> <p>2 engineering.</p> <p>3 Q. And you've not studied polypropylene</p> <p>4 before your work in this case; correct?</p> <p>5 A. No. But I've studied oxidative</p> <p>6 degradation of other polymers.</p> <p>7 Q. And polyurethane is an issue of your</p> <p>8 interest?</p> <p>9 A. Yes.</p> <p>10 Q. Does polyurethane degrade in vivo?</p> <p>11 A. Polyurethane is a broad term. So</p> <p>12 part of my research, we design lysine-derived</p> <p>13 polyurethane grafts that we published a couple</p> <p>14 of papers reporting that they undergo oxidative</p> <p>15 degradation. But those polymers are the tissue</p> <p>16 grafts, so they're designed to degrade</p> <p>17 oxidatively.</p> <p>18 The other side would be biostable</p> <p>19 polyurethane implants. They are designed to be</p> <p>20 biostable. Jim Anderson did a lot of work</p> <p>21 over the years investigating the oxidative</p> <p>22 degradation of polyether urethanes. So other</p> <p>23 materials such as polycarbonate urethanes have</p> <p>24 have been studied that are more oxidatively</p>	<p style="text-align: right;">Page 81</p> <p>1 they were not seeing the same amount of</p> <p>2 cracking that they saw in the polypropylene.</p> <p>3 Q. Do you have an opinion, Dr. Guelcher,</p> <p>4 that there's any polymer that can be implanted</p> <p>5 in the human body that is not subject to</p> <p>6 oxidative degradation?</p> <p>7 A. That's not really within the scope of</p> <p>8 my report. I mean, my report is focusing on</p> <p>9 oxidative degradation of polypropylene. I'm</p> <p>10 just noting observations that there are</p> <p>11 polymers that appear to undergo less oxidative</p> <p>12 degradation.</p> <p>13 Q. Whether it's in the scope of your</p> <p>14 report or not, do you have an opinion in that</p> <p>15 regard?</p> <p>16 A. I have an opinion that some materials</p> <p>17 are going to degrade more slowly in response to</p> <p>18 that foreign body reaction than others. But I</p> <p>19 don't know that it's been shown conclusively</p> <p>20 that they do or don't. The data aren't there.</p> <p>21 Q. So is it fair to understand that you</p> <p>22 do not have an opinion as to whether there's</p> <p>23 any polymer that's available for implantation</p> <p>24 as a medical device that does not undergo</p>

21 (Pages 78 to 81)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 82</p> <p>1 oxidative degradation?</p> <p>2 A. I mean, I wouldn't say does not. I</p> <p>3 would just say it's much more stable than</p> <p>4 polypropylene. There are polymers that are</p> <p>5 more oxidatively stable than polypropylene.</p> <p>6 Q. What are those?</p> <p>7 A. Well, the PVDF and --</p> <p>8 Q. What else? We've talked about PVDF.</p> <p>9 Anything else?</p> <p>10 A. What else did I look at? I said</p> <p>11 polycarbonate urethanes are more stable</p> <p>12 against oxidative degradation than polyethers.</p> <p>13 Those would be a few.</p> <p>14 Again, I'm not -- I'm focusing in my</p> <p>15 report my opinions on that polypropylene</p> <p>16 degrades oxidatively in a significant rate.</p> <p>17 Q. Going back to your report, page 4,</p> <p>18 note 4, do you know what site is appropriate</p> <p>19 there that is left out in footnote 4?</p> <p>20 A. I don't. I don't have that with me.</p> <p>21 Q. The next paragraph says, The</p> <p>22 oxidation of the polymer on the tertiary</p> <p>23 hydrogen bond is the rate controlling step in</p> <p>24 this process, and it will result in the</p>	<p style="text-align: right;">Page 84</p> <p>1 is relatively -- it's a very small slope.</p> <p>2 And then at some point when that</p> <p>3 induction time is reached, it becomes</p> <p>4 autocatalytic, and the concentration of those</p> <p>5 groups increases.</p> <p>6 What Fayolle is saying is that</p> <p>7 critical molecular weight for embrittlement in</p> <p>8 the materials he looked at, he was reporting a</p> <p>9 molecular weight of 200,000 grams per mole.</p> <p>10 And he noted that that embrittlement on the</p> <p>11 basis of mechanical testing, that embrittlement</p> <p>12 is happening prior to the induction time</p> <p>13 measured by spectroscopy.</p> <p>14 Q. I'm going to need you to help me</p> <p>15 understand these charts.</p> <p>16 A. Okay.</p> <p>17 Q. We're on page 5 now of Exhibit No. 1.</p> <p>18 A. Right.</p> <p>19 Q. And these are charts that you</p> <p>20 borrowed from Dr. Fayolle's paper?</p> <p>21 A. They were published in the Fayolle</p> <p>22 study from 2000.</p> <p>23 Q. At the top of (a), it says</p> <p>24 spectrophotometric induction time. What does</p>
<p style="text-align: right;">Page 83</p> <p>1 polypropylene's molecular chain being broken</p> <p>2 and the reaction repeating until no more</p> <p>3 polypropylene can be broken down. What does</p> <p>4 that mean?</p> <p>5 A. I think that statement is referring</p> <p>6 to this autocatalytic effect. Once you start</p> <p>7 to form these reactive species on the surface,</p> <p>8 it just continues to react. There's no reason</p> <p>9 for it to stop. It will continue to react and</p> <p>10 in later stages of degradation, there could be</p> <p>11 molecular weight loss and embrittlement.</p> <p>12 Q. At what stage would there be</p> <p>13 molecular weight loss?</p> <p>14 A. That's addressed by this concept of</p> <p>15 the induction time. So the paper by Fayolle</p> <p>16 and Liebert, these papers together are</p> <p>17 suggesting -- there's a -- Fayolle put out the</p> <p>18 notion that embrittlement can happen -- this is</p> <p>19 in figure 1.</p> <p>20 So the induction time that's measured</p> <p>21 by, in this case, the FTIR measurements, the</p> <p>22 induction time is where there's this sharp</p> <p>23 change in the slope of the curve. So the</p> <p>24 concentration of hydroxyle and carbonyl groups</p>	<p style="text-align: right;">Page 85</p> <p>1 that mean?</p> <p>2 A. The spectrophotometric induction time</p> <p>3 is the time at which there's that change in the</p> <p>4 slope of concentration of hydroxyle groups and</p> <p>5 carbonyl groups. So that line is almost flat,</p> <p>6 so there's very small change.</p> <p>7 And then at some point, it becomes</p> <p>8 autocatalytic. The concentration of these</p> <p>9 groups on the surface is high enough that now</p> <p>10 the rate at which the oxidation reaction is</p> <p>11 happening is much faster. That's the induction</p> <p>12 time.</p> <p>13 Q. Just for my benefit, the</p> <p>14 spectrophotometric induction time is</p> <p>15 represented in figure A as the triangles and</p> <p>16 squares at the bottom?</p> <p>17 A. Yes.</p> <p>18 Q. And so at the point at about, oh, 250</p> <p>19 to 260 is where there's a change in the</p> <p>20 hydroxyle groups and carbonyl groups which</p> <p>21 reflects a chemical change in the</p> <p>22 polypropylene?</p> <p>23 A. That's right.</p> <p>24 Q. So the embrittlement induction time</p>

22 (Pages 82 to 85)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 86</p> <p>1 means what?</p> <p>2 A. This is a nice part of the work that</p> <p>3 Fayolle did. He was measuring ultimate</p> <p>4 elongation here by this. So embrittlement</p> <p>5 induction time, that's where the axis on the</p> <p>6 left with the curves with the hash lines, as you</p> <p>7 can see, the elongation is relatively constant.</p> <p>8 Then when you reach this embrittlement</p> <p>9 induction time, the material becomes highly</p> <p>10 brittle and less elongation.</p> <p>11 Q. What does elongation mean?</p> <p>12 A. That's the amount that you can</p> <p>13 stretch it. Out here, it's 800 percent. You</p> <p>14 can stretch it to eight times its initial</p> <p>15 length. When it becomes brittle, that number</p> <p>16 drops below -- then even small amounts of</p> <p>17 strain cause the material to fail.</p> <p>18 Q. Now, is it fair to understand --</p> <p>19 again, me trying to understand this chart --</p> <p>20 that at the beginning of the study, the range</p> <p>21 of the elongation is around 750 to 900?</p> <p>22 A. Right.</p> <p>23 Q. And then over time, it decreases and</p> <p>24 then drops off rather dramatically at about 125</p>	<p style="text-align: right;">Page 88</p> <p>1 there.</p> <p>2 These concepts of tie chains and</p> <p>3 amorphous chains that connect crystalline</p> <p>4 regions are breaking and that can lead to</p> <p>5 embrittlement. So what Fayolle is saying is</p> <p>6 that changes in the polymer that lead to</p> <p>7 embrittlement happen before large</p> <p>8 concentrations of hydroxyle and carbonyl</p> <p>9 groups, which has been the traditional way.</p> <p>10 Even XPS would measure formation of hydroxyle</p> <p>11 and carbonyl groups on the surface.</p> <p>12 What Fayolle is saying is that</p> <p>13 embrittlement happens you can really -- before</p> <p>14 that becomes appreciable. It becomes this</p> <p>15 autocatalytic increase.</p> <p>16 Q. Now, figure B uses axes of molecular</p> <p>17 weight, time, and concentration moles per</p> <p>18 kilogram; correct?</p> <p>19 A. Yes.</p> <p>20 Q. Is B appropriate to overlay on A?</p> <p>21 A. So my comments, my notations, on</p> <p>22 Panel B were designed to kind of interpret A</p> <p>23 especially in light of Liebert.</p> <p>24 So Fayolle reports a critical</p>
<p style="text-align: right;">Page 87</p> <p>1 to 175 hours. Am I reading that correctly?</p> <p>2 A. Yes.</p> <p>3 Q. So after that period of time, you</p> <p>4 have a reduction in elongation and increase in</p> <p>5 embrittlement. And then about 75 hours later,</p> <p>6 you have an increase in the hydroxyle and the</p> <p>7 carbonyl groups. Is that fair?</p> <p>8 A. That's right.</p> <p>9 Q. Each one of these changes that are</p> <p>10 shown in Exhibit A amount to a change in the</p> <p>11 chemical structure of the polypropylene;</p> <p>12 correct?</p> <p>13 A. Well, the hydroxyle and carbonyl</p> <p>14 groups, that's the introduction of bound</p> <p>15 oxygen. The embrittlement is a mechanical</p> <p>16 property. That's not a -- the structure of the</p> <p>17 polymer is changing. It's becoming brittle.</p> <p>18 Q. But the chemical structure of the</p> <p>19 polymer does not change in figure A until you</p> <p>20 get to the formation of the hydroxyle groups</p> <p>21 and the carbonyl groups?</p> <p>22 A. The chemical structure is breaking,</p> <p>23 and Fayolle explains the details. And there's</p> <p>24 some explanations for what could be happening</p>	<p style="text-align: right;">Page 89</p> <p>1 molecular weight for embrittlement in the</p> <p>2 polymers he was looking at 200,000 grams per</p> <p>3 mole. The polypropylene samples he was using</p> <p>4 became embrittled when the molecular weight</p> <p>5 dropped to 200,000 grams per mole. That's what</p> <p>6 that critical molecular weight -- that's what</p> <p>7 Fayolle was saying.</p> <p>8 Q. It starts at about 225,000?</p> <p>9 A. That's when the material becomes</p> <p>10 sufficiently brittle that it's -- the material</p> <p>11 is basically brittle.</p> <p>12 Q. This shows the change in molecular</p> <p>13 weight over time?</p> <p>14 A. Yes.</p> <p>15 Q. And at about 210 hours is when you</p> <p>16 reach a reduction in molecular weight from</p> <p>17 about 260 to about 200,000?</p> <p>18 A. That's how Fayolle defined it, as</p> <p>19 embrittlement at that 200,000 molecular weight.</p> <p>20 Q. The molecular weight then continues</p> <p>21 to become reduced until at about 260 hours the</p> <p>22 molecular weight of the polypropylene or</p> <p>23 whatever substance you're measuring at that</p> <p>24 point is down around 75,000; correct?</p>

23 (Pages 86 to 89)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 90</p> <p>1 A. That's right.</p> <p>2 Q. Now, the hydroxyle group and the</p> <p>3 carbonyl groups are the same graphs that are on</p> <p>4 figure A; correct?</p> <p>5 A. Yes.</p> <p>6 Q. So at the bottom where you have time</p> <p>7 and days and subcutaneous implantation, what</p> <p>8 does that mean?</p> <p>9 A. So I added the line -- the red line</p> <p>10 at the bottom is a way to interpret the data</p> <p>11 from Liebert. So what Liebert was teaching was</p> <p>12 that -- he reported an induction time of 108</p> <p>13 days by his own -- he did very similar measures</p> <p>14 on explanted materials of hydroxyl and carbonyl</p> <p>15 groups.</p> <p>16 And he reported in vivo induction</p> <p>17 time of 108 days. And then he notes if you</p> <p>18 consider molecular oxygen as the source and</p> <p>19 physiological temperatures, there should be an</p> <p>20 induction time of 20 years, and yet we're</p> <p>21 measuring 108 days. Clearly, there has to be</p> <p>22 some sort of reactive oxygen within the body.</p> <p>23 Based on the work of Anderson and</p> <p>24 others, we know now that that's associated with</p>	<p style="text-align: right;">Page 92</p> <p>1 pull together the auto-oxidation that's</p> <p>2 observed in air at elevated temperatures with</p> <p>3 what happens in the body. It's just a</p> <p>4 different source of oxygen, reactive oxygen in</p> <p>5 the body.</p> <p>6 Q. So in the Fayolle part of figure B on</p> <p>7 page 5 where it shows at 210 hours there's the</p> <p>8 critical molecular weight for embrittlement,</p> <p>9 you drop down and get at about 90 days. How do</p> <p>10 those two -- 210 hours, which is less than ten</p> <p>11 days, and 90 days -- how can you draw those</p> <p>12 together?</p> <p>13 A. Well, that's what I was saying. So</p> <p>14 the hours axis is that's the auto-oxidation</p> <p>15 that just happens with molecular oxygen as an</p> <p>16 oxygen source at elevated temperatures.</p> <p>17 What Liebert is saying is this</p> <p>18 process happens over this time of about 100</p> <p>19 days in vivo because there's a different source</p> <p>20 of reactive oxygen. It's the reactive oxygen</p> <p>21 species secreted by the inflammatory cells.</p> <p>22 That's why -- that's the difference in the time</p> <p>23 scale.</p> <p>24 Q. Okay. And so the time scale for</p>
<p style="text-align: right;">Page 91</p> <p>1 the foreign body response. That's where the</p> <p>2 208 days come from. That's the induction time</p> <p>3 measured by Liebert for unstabilized</p> <p>4 polypropylene explanted from the sutures in the</p> <p>5 films -- explanted from the hamsters.</p> <p>6 So the 90 days is an approximation of</p> <p>7 this concept of Fayolle that it basically</p> <p>8 becomes embrittled before this induction time,</p> <p>9 and he's basically saying -- you can deduce</p> <p>10 from this as around 90 or a hundred days it's</p> <p>11 becoming embrittled, unstabilized polypropylene</p> <p>12 in vivo. That's what this is saying.</p> <p>13 Q. And figure A is all Fayolle; correct?</p> <p>14 A. Both of those plots, the plots</p> <p>15 themselves came from Fayolle. Everything in</p> <p>16 black came from Fayolle.</p> <p>17 Q. All I have is black and white.</p> <p>18 A. All right. So I used a different</p> <p>19 font. You can probably tell a difference in</p> <p>20 the fonts that I used.</p> <p>21 Q. The time (days) subcutaneous</p> <p>22 implantation, where does that come from?</p> <p>23 A. That is the time scale that Liebert</p> <p>24 measured. So what this plot is trying to do is</p>	<p style="text-align: right;">Page 93</p> <p>1 Liebert, where you say that the embrittlement</p> <p>2 will occur at about 90 days, is based upon</p> <p>3 Liebert's study of polypropylene without</p> <p>4 antioxidants?</p> <p>5 A. Right.</p> <p>6 Q. And the Fayolle study is based upon</p> <p>7 testing of polypropylene with the antioxidants</p> <p>8 removed; correct?</p> <p>9 A. Let me look at the Fayolle study</p> <p>10 again to make sure.</p> <p>11 Q. Do you recall that without looking?</p> <p>12 A. Let me look at it for a minute.</p> <p>13 Q. I have it for you here if that's</p> <p>14 easier.</p> <p>15 A. I've got it.</p> <p>16 MR. THOMAS: Let me mark it anyway as</p> <p>17 a deposition exhibit. It's deposition</p> <p>18 Exhibit 8, a copy of the Fayolle study.</p> <p>19 (Exhibit 8 was marked.)</p> <p>20 Q. (By Mr. Thomas) Exhibit 8 is a study</p> <p>21 titled Oxidation Induced Embrittlement in</p> <p>22 Polypropylene, a tensile testing study June</p> <p>23 2000 by B. Fayolle, F-a-y-o-l-l-e.</p> <p>24 A. So he says in the experimental</p>

24 (Pages 90 to 93)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 94</p> <p>1 section, The additives, I'm presuming the 2 stabilizers, antioxidants were extracted in a 3 soxhlet extractor in chloroform hexane ethanol. 4 I would interpret that statement as saying 5 that there was also unstabilized polypropylene. 6 Q. Have you seen any testing of 7 stabilized polypropylene to support the 8 positions that you take on page 5 of Exhibit 9 No. 1? 10 A. No. These data were the data that I 11 had for unstabilized polypropylene. 12 Q. Let's take a quick break please. 13 (A break was taken from 11:31 a.m. to 14 11:41 a.m.) 15 Q. (By Mr. Thomas) Let's go back to 16 page 5 of Exhibit No. 1. Is it fair to 17 understand, based upon your analysis of Liebert 18 and Fayolle as depicted in these two graphs on 19 page 5, that there is no embrittlement without 20 a loss of molecular weight? 21 A. I don't know that I would say it that 22 way. I would say that loss in molecular weight 23 leads to embrittlement. 24 Q. Okay. The tests that we've just</p>	<p style="text-align: right;">Page 96</p> <p>1 discussed on page 5 of your report, to your 2 knowledge, this type of analysis has not been 3 done for polypropylene with antioxidant 4 packages? 5 MR. JACKSON: Objection to form. 6 A. I don't know that this particular 7 test has been done for polypropylene with the 8 antioxidant. 9 Q. Okay. Now, the Fayolle paper, 10 Exhibit No. 8, also deals with thermal 11 oxidation of polypropylene films. Do you see 12 that? 13 A. Yes. 14 Q. Does the fact that they're testing 15 polypropylene films as opposed to polypropylene 16 sutures or mesh have any impact on your 17 opinions? 18 A. Let me look at this for just a 19 minute. 20 I'm just looking to see if he -- they 21 don't report film thicknesses. 22 Q. Look at the very beginning in the 23 abstract. They talk about a hundred microns. 24 Is that the thickness of the film?</p>
<p style="text-align: right;">Page 95</p> <p>1 discussed -- strike that. The papers that 2 we've just discussed by Fayolle and Liebert 3 where you used test data from polypropylene 4 without antioxidants, these same tests could be 5 used for testing polypropylene with 6 antioxidants, couldn't they? 7 A. These tests? 8 Q. Yes. 9 A. Yes. You have to go out to longer 10 time points, but they could be used. 11 Q. Right. And to your knowledge, none 12 of that testing has been done? 13 A. Not using this specific approach. I 14 mean, there are papers where people have looked 15 at explants and noted evidence of surface 16 oxidation, but not this type of time course. A 17 mechanistic study that would have to be done 18 in vitro. 19 Q. The studies that you're referring to 20 are the Clave and Costello articles that you 21 referred to elsewhere in your report? 22 A. Yes. 23 Q. But in terms of the types of studies 24 conducted by Liebert and by Fayolle that are</p>	<p style="text-align: right;">Page 97</p> <p>1 A. Okay. Yeah. I see a hundred 2 microns. For some reason it's not in the 3 experimental. 4 So my -- why I believe they used 5 hundred micron films is because these films are 6 very thin. So because they're so thin, these 7 changes in the surface are going to result in 8 molecular weight degradation because the 9 sutures are much thicker. So -- they're on the 10 millimeter scale. 11 Basically, because they're using 12 these thin films, that allows them to measure 13 these changes in molecular weight more 14 accurately, because molecular weight is a 15 volume average property. So if you use a very 16 thin film, then surface degradation is going to 17 contribute more to molecular weight loss of the 18 bulk polymer. 19 Q. How big are sutures, did you say? 20 A. Three or five -- let me just look. 21 It was in one of these studies. Let me find 22 it. I thought it was. I can't seem to find 23 it. 24 Q. It's not really important to my</p>

25 (Pages 94 to 97)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 98</p> <p>1 question.</p> <p>2 A. Okay.</p> <p>3 Q. Is there a difference between the use</p> <p>4 of a film and the use of a suture for purposes</p> <p>5 of this analysis done by Fayolle?</p> <p>6 A. You would see the same changes on the</p> <p>7 surface of a suture that you would see on the</p> <p>8 surface of a film. But you might not see the</p> <p>9 same changes in molecular weight because with</p> <p>10 the film, the surface is a larger -- well,</p> <p>11 okay.</p> <p>12 Q. The oxidation that Fayolle studies is</p> <p>13 thermal oxidation, isn't it?</p> <p>14 A. It's thermal oxidation. That was the</p> <p>15 point of figure 1 in my report of page 5 was to</p> <p>16 connect the time scales. What Liebert was</p> <p>17 saying is thermal oxidation under physiological</p> <p>18 conditions, molecular oxygen, 37 c. would take</p> <p>19 20 years, but he observes 108 days. That</p> <p>20 points to a much more reactive source of oxygen</p> <p>21 in the body.</p> <p>22 So they're similar processes. It's</p> <p>23 just the difference in the source of the</p> <p>24 oxygen. Fayolle was looking at sort of</p>	<p style="text-align: right;">Page 100</p> <p>1 that you conducted yourself; true?</p> <p>2 A. Yes. These are literature data. As</p> <p>3 I said earlier, we didn't even have materials</p> <p>4 to test for this sort of work.</p> <p>5 Q. Paragraph 2 on page 6 titled</p> <p>6 Polypropylene Degradation In Vivo, the second</p> <p>7 full paragraph says, Macrophages and FBGCs</p> <p>8 attached to biomaterials are known to lead to</p> <p>9 degradation and device failure.</p> <p>10 There's no cite there. Do you know</p> <p>11 what cite is appropriate there?</p> <p>12 A. Which paragraph is this again?</p> <p>13 Q. Right in the middle of the page,</p> <p>14 adhesion of macrophages. The last sentence</p> <p>15 reads, Macrophages and FBGCs attached to</p> <p>16 biomaterials are known to lead to degradation</p> <p>17 and device failure?</p> <p>18 A. I believe Anderson discusses this</p> <p>19 point. In my own research, we've shown that</p> <p>20 macrophages attached to the scaffolds lead to</p> <p>21 active degradation. We published that in 2011.</p> <p>22 Q. With what material?</p> <p>23 A. With the polyurethane.</p> <p>24 Q. Have you found any kind of literature</p>
<p style="text-align: right;">Page 99</p> <p>1 thermally-induced where you heat it up, and</p> <p>2 molecular oxygen is actually the source of</p> <p>3 oxygen that causes reaction.</p> <p>4 Q. Thermal oxidation, is at 90 degrees</p> <p>5 c.?</p> <p>6 A. I don't know what temperature he</p> <p>7 used.</p> <p>8 Q. First page of the abstract.</p> <p>9 A. 90 c.</p> <p>10 Q. And normal body temperature is 37 c.?</p> <p>11 A. Yeah. But I was saying that Liebert</p> <p>12 noted that thermal oxidation in the body is</p> <p>13 much slower, but there's another source of</p> <p>14 reactive oxygen. That's the reactive oxygen</p> <p>15 secreted by the inflammatory cells in the body.</p> <p>16 The purpose of that figure was to</p> <p>17 show that -- Liebert has a similar plot of</p> <p>18 hydroxyl and carbonyl groups from the explants.</p> <p>19 It's the same reaction. It's just a different</p> <p>20 source of reactive oxygen.</p> <p>21 Q. So the conclusions that you reached</p> <p>22 with respect to opinion No. 1 in your report</p> <p>23 are based upon your review of the literature</p> <p>24 that you've discussed and not on any testing</p>	<p style="text-align: right;">Page 101</p> <p>1 which supports the proposition that macrophages</p> <p>2 and FBGCs attached to polypropylene are known</p> <p>3 to lead to degradation and device failure?</p> <p>4 A. Well, some of the clinical studies</p> <p>5 report the presence of an inflammatory</p> <p>6 infiltrate in these cells, and some of these</p> <p>7 materials extruded or became affected.</p> <p>8 Q. My question is simpler than that. My</p> <p>9 question is whether you're aware of any peer-</p> <p>10 reviewed literature which finds that</p> <p>11 macrophages and FBGCs attached to polypropylene</p> <p>12 are known to lead to degradation and device</p> <p>13 failure?</p> <p>14 A. For polypropylene, it's not been</p> <p>15 studied specifically. But, again, in those</p> <p>16 images, it shows -- the ones that are more</p> <p>17 where you see these inflammatory cells, it's</p> <p>18 associated with oxidative degradation.</p> <p>19 Q. Just so we're clear, though, you've</p> <p>20 not found any peer-reviewed literature that</p> <p>21 finds that macrophages and FBGCs attached to</p> <p>22 polypropylene lead to device failure?</p> <p>23 A. I mean, that's a very narrowly worded</p> <p>24 statement. I don't want to be boxed in by</p>

26 (Pages 98 to 101)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 102</p> <p>1 that.</p> <p>2 Q. Is it true?</p> <p>3 A. I'm going to stick by my answer.</p> <p>4 There are inflammatory cells present, and he's</p> <p>5 explaining samples that failed.</p> <p>6 Q. Is there any report in the peer-</p> <p>7 reviewed literature that any polypropylene mesh</p> <p>8 or suture failed due to macrophages and FBGCs</p> <p>9 attaching to polypropylene?</p> <p>10 A. Let me look at Clave again.</p> <p>11 (Exhibit 9 was marked.)</p> <p>12 Q. (By Mr. Thomas) For the record,</p> <p>13 you're referring to Exhibit No. 9, which is the</p> <p>14 Clave article. So Clave reports two types of</p> <p>15 responses, a Type 1 and a Type 2 reaction</p> <p>16 characteristic of an infection. A majority</p> <p>17 of altered polymorphonuclear neutrophils</p> <p>18 were found; suggested an infectious process.</p> <p>19 This is on page 263 under the histological</p> <p>20 analysis.</p> <p>21 He also reports a Type 2 reaction is</p> <p>22 chronic inflammation rich in giant cells and</p> <p>23 mononuclear cells. And then he also sees</p> <p>24 these -- evidence of what could be oxidative</p>	<p style="text-align: right;">Page 104</p> <p>1 And many of those explants, he saw inflammatory</p> <p>2 reactions associated with infection or a</p> <p>3 chronic inflammatory response.</p> <p>4 He saw cracking on the surface which</p> <p>5 is consistent with oxidative degradation as</p> <p>6 even pointed out in Ethicon's studies, the dog</p> <p>7 study and the human explants.</p> <p>8 He sees evidence by FTIR of carbonyl</p> <p>9 groups that are associated with oxidative</p> <p>10 degradation. Now he comments that he can't say</p> <p>11 whether it's oxidative degradation or whether</p> <p>12 it's something else, but it's consistent with</p> <p>13 the notion of oxidative degradation.</p> <p>14 So when you take Clave plus Ethicon's</p> <p>15 own data that oxidation can lead to surface</p> <p>16 cracking and embrittlement, I think Clave is</p> <p>17 teaching that meshes that were explanted</p> <p>18 because of complications because they failed</p> <p>19 showed this inflammatory response and surface</p> <p>20 oxidation. That's the way that I would answer</p> <p>21 your question.</p> <p>22 Q. Is Clave the only support that you</p> <p>23 have that macrophages and FBGCs attached to</p> <p>24 biomaterials are known to lead to degradation</p>
<p style="text-align: right;">Page 103</p> <p>1 degradation. He sees evidence of cracking.</p> <p>2 These are basically supporting his</p> <p>3 conclusions that these polypropylene implants</p> <p>4 are altered in vivo.</p> <p>5 Q. * But there's nothing in Clave's</p> <p>6 article, Exhibit No. 9, that discusses device</p> <p>7 failure, is there?</p> <p>8 A. Let me read what he wrote again.</p> <p>9 Well, I mean, these are a hundred implants,</p> <p>10 explanted from patients due to complications.</p> <p>11 So I would say that the device failed if they</p> <p>12 had to take it out because of complications.</p> <p>13 Q. When you're talking about</p> <p>14 degradation, you're talking about the</p> <p>15 polypropylene being degraded to the point where</p> <p>16 it breaks or fails; correct?</p> <p>17 A. No. I think that's discussed in my</p> <p>18 report, is where you have surface oxidation</p> <p>19 that can lead to molecular weight loss,</p> <p>20 embrittlement, cracking, is a whole chain of</p> <p>21 events that happens.</p> <p>22 What I'm saying is that Clave took a</p> <p>23 hundred explants from patients that had</p> <p>24 complications that had problems with the mesh.</p>	<p style="text-align: right;">Page 105</p> <p>1 and device failure?</p> <p>2 A. Let me look at Costello as well.</p> <p>3 Q. Is Costello the only other one that</p> <p>4 you would look to? That's not an Ethicon mesh,</p> <p>5 by the way, is it?</p> <p>6 A. No. But it does have a polypropylene</p> <p>7 component, I believe.</p> <p>8 Q. Does it have a polypropylene</p> <p>9 component with the Ethicon added effect?</p> <p>10 A. I don't know. Let me just see what</p> <p>11 he says. Yeah, these were the Bard</p> <p>12 composites. But he discusses oxidation. He</p> <p>13 has some SCM images showing surface effects,</p> <p>14 effects of surface oxidation.</p> <p>15 Q. You're in the Costello study now?</p> <p>16 A. Yes.</p> <p>17 Q. Is polypropylene ever appropriate to</p> <p>18 use in a medical device?</p> <p>19 MR. JACKSON: Objection to form.</p> <p>20 A. I'm not really here to speak to that.</p> <p>21 I was looking at suitability for polypropylene</p> <p>22 in these pelvic floor-type applications.</p> <p>23 Q. (By Mr. Thomas) For the pelvic</p> <p>24 floor, is polypropylene ever appropriate to use</p>

27 (Pages 102 to 105)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 106</p> <p>1 in a medical device?</p> <p>2 A. Not saying whether it's appropriate</p> <p>3 to use or not. I'm saying that it can undergo</p> <p>4 surface oxidation due to the foreign body</p> <p>5 reaction that can lead to changes in the</p> <p>6 polypropylene, and those changes are not fully</p> <p>7 understood.</p> <p>8 They're observed by Ethicon in their</p> <p>9 own studies. They were never really followed</p> <p>10 up on or understood. And so the long-term</p> <p>11 behavior of the device is unpredictable. I'm</p> <p>12 not saying that it can never be used. I'm</p> <p>13 saying because of these changes due to foreign</p> <p>14 body reaction, its performance can be</p> <p>15 unpredictable.</p> <p>16 Q. You say it's unpredictable. Does</p> <p>17 that mean you do not have an opinion as to what</p> <p>18 will happen to the device over the life of its</p> <p>19 implantation?</p> <p>20 A. I believe that over the life of its</p> <p>21 implantation, the polymer will change in</p> <p>22 response to the foreign body reaction. Well,</p> <p>23 specific changes would be loss of molecular</p> <p>24 weight, embrittlement. In some patients, that</p>	<p style="text-align: right;">Page 108</p> <p>1 A. Well, I think that these papers are</p> <p>2 showing there is surface oxidation that we know</p> <p>3 leads to embrittlement. Then these devices that</p> <p>4 are extruded are infected as a complication.</p> <p>5 So I think that these papers are</p> <p>6 showing the connection between the two.</p> <p>7 Q. Are there any papers in the medical</p> <p>8 or scientific literature that suggest that</p> <p>9 surface oxidation of polypropylene mesh can</p> <p>10 lead to extrusion?</p> <p>11 A. I think Clave is suggesting this, as</p> <p>12 I was explaining. He sees these hundred meshes</p> <p>13 where there were problems. He sees evidence of</p> <p>14 surface oxidation. He sees inflammatory cells</p> <p>15 and the infiltrate infection.</p> <p>16 Q. Is that the sole basis for your</p> <p>17 opinion that surface oxidation of polypropylene</p> <p>18 mesh can lead to extrusions, the Clave article?</p> <p>19 A. Clave would probably be the one.</p> <p>20 Q. Anything about your own work that</p> <p>21 you've done in your training, education, and</p> <p>22 experience outside of Clave that leads you to</p> <p>23 conclude that surface oxidation of</p> <p>24 polypropylene mesh can lead to extrusion?</p>
<p style="text-align: right;">Page 107</p> <p>1 can lead to extrusion, pain. It's consistent</p> <p>2 with those adverse events in patients.</p> <p>3 And I believe that the instability of</p> <p>4 the polymer can contribute to those adverse</p> <p>5 events.</p> <p>6 Q. Okay. What is it that allows you to</p> <p>7 offer the opinion that the surface oxidation of</p> <p>8 polypropylene that you've described leads to</p> <p>9 extrusions?</p> <p>10 A. Well, I think Ethicon even noted in</p> <p>11 some of their documents the importance of</p> <p>12 matching the properties of the mesh to the</p> <p>13 properties of the host tissue. This is known,</p> <p>14 it's true just -- it's important to match the</p> <p>15 properties of the implant to that of the</p> <p>16 tissue.</p> <p>17 So if you have an implant that now is</p> <p>18 becoming very brittle, it's no longer</p> <p>19 comparable to the tissue that it's surrounded</p> <p>20 by.</p> <p>21 Q. Is this something you're just</p> <p>22 deducing and piecing together or something</p> <p>23 that's based upon any kind of medicine or</p> <p>24 science?</p>	<p style="text-align: right;">Page 109</p> <p>1 A. Not that I'm aware of.</p> <p>2 Q. What is the basis for your opinion</p> <p>3 that surface oxidation on polypropylene mesh</p> <p>4 leads to pain?</p> <p>5 A. I think if you have a brittle piece</p> <p>6 of plastic embedded in soft tissue, it's going</p> <p>7 to be painful.</p> <p>8 Q. Is this based upon what you know or</p> <p>9 based upon any scientific literature to support</p> <p>10 your position?</p> <p>11 A. I would have to look for some papers</p> <p>12 on this. But, I mean, I think it's obvious if</p> <p>13 you have brittle plastic in your body, it's</p> <p>14 going to hurt.</p> <p>15 Q. It's based on that obviousness as</p> <p>16 opposed to your review of any scientific</p> <p>17 literature; is that fair?</p> <p>18 A. I can't think of a paper right now</p> <p>19 that explicitly says that.</p> <p>20 Q. Just so we understand, you don't know</p> <p>21 whether the mesh in Ms. Edwards was brittle, do</p> <p>22 you, to use the term as you've used it?</p> <p>23 MS. LEWIS: Objection: Form.</p> <p>24 A. We didn't have an opportunity to</p>

28 (Pages 106 to 109)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 110</p> <p>1 measure that.</p> <p>2 Q. (By Mr. Thomas) The same is true</p> <p>3 with the mesh of Ms. Edwards, you don't have</p> <p>4 any idea whether the mesh in Ms. Edwards was</p> <p>5 brittle, using the term as you've used it?</p> <p>6 MS. LEWIS: Objection: Form.</p> <p>7 MR. JACKSON: I'm going to object</p> <p>8 too. You brought two names in there.</p> <p>9 MR. THOMAS: Let me start over again.</p> <p>10 I want to get a clean question.</p> <p>11 Q. (By Mr. Thomas) It's fair to</p> <p>12 understand, Dr. Guelcher, that you don't know</p> <p>13 whether the mesh in Ms. Huskey was brittle</p> <p>14 using the term as you've used it here today.</p> <p>15 MR. JACKSON: Object to the form.</p> <p>16 A. Without the explant materials, we</p> <p>17 couldn't do that assessment.</p> <p>18 Q. It's fair to understand that you</p> <p>19 don't know as you sit here today whether the</p> <p>20 mesh in Ms. Edwards was brittle using that term</p> <p>21 as you've used it here today?</p> <p>22 MS. LEWIS: Objection: Form.</p> <p>23 A. Without the explants, we can't do the</p> <p>24 measurement.</p>	<p style="text-align: right;">Page 112</p> <p>1 brittle material would not be very tough</p> <p>2 because if you take it out to small strains, it</p> <p>3 fails.</p> <p>4 Q. Okay. Do you know whether Ethicon</p> <p>5 Prolene after implantation is more or less</p> <p>6 tough after seven years?</p> <p>7 MR. JACKSON: Object to the form.</p> <p>8 A. Well, I think that question is rather</p> <p>9 complicated. Let me find the data.</p> <p>10 Q. (By Mr. Thomas) Are you looking in</p> <p>11 the seven-year dog study now?</p> <p>12 A. Yes. I'm trying to find the data. I</p> <p>13 don't know. I'm not finding the data here.</p> <p>14 Q. Do you have a recollection of looking</p> <p>15 at the toughness data in the Ethicon studies?</p> <p>16 A. From what I remember, there was the</p> <p>17 elongation was either the same after a year or</p> <p>18 even got a little worse after two years. And</p> <p>19 all of a sudden in seven years, it becomes much</p> <p>20 more ductile.</p> <p>21 So I had questions about the</p> <p>22 methodology used to do those measurements. All</p> <p>23 the materials that were tested showed that same</p> <p>24 trend. All four of them, the Ethicon, Novafil,</p>
<p style="text-align: right;">Page 111</p> <p>1 Q. (By Mr. Thomas) On page 6 of your</p> <p>2 report, you again identify examples of</p> <p>3 polyurethanes which have degraded over time.</p> <p>4 Did you try to identify any polypropylene</p> <p>5 products that had degraded over time that led</p> <p>6 to device failures?</p> <p>7 A. Well, I mean, again, I think Clave</p> <p>8 addresses this point of connecting surface</p> <p>9 degradation with failure of a mesh.</p> <p>10 Q. Okay. Other than Clave, did you find</p> <p>11 any other evidence of device failure using</p> <p>12 polypropylene?</p> <p>13 MR. JACKSON: Object to the form.</p> <p>14 A. That's the one I can think of right</p> <p>15 now.</p> <p>16 Q. (By Mr. Thomas) Okay. What is</p> <p>17 toughness?</p> <p>18 MR. JACKSON: Object to the form.</p> <p>19 A. Well, toughness is typically</p> <p>20 associated with the area under the stress/</p> <p>21 strain curve.</p> <p>22 Q. What does it mean?</p> <p>23 A. It's a measure of how much energy a</p> <p>24 material can absorb before it fails. So a</p>	<p style="text-align: right;">Page 113</p> <p>1 Prolene, they all showed that same trend.</p> <p>2 So this report in the expert report</p> <p>3 focused on seven-year data. But if this were</p> <p>4 really going on, why aren't you seeing it in</p> <p>5 the one- or two-year data. It just seems</p> <p>6 strange to me.</p> <p>7 Q. Have you seen other studies conducted</p> <p>8 on Ethicon prolene polypropylene analyzing</p> <p>9 the extent to which the implanted polypropylene</p> <p>10 is more tough than the pristine polypropylene.</p> <p>11 A. The only data I've seen on Ethicon</p> <p>12 polypropylene is the dog study where they did</p> <p>13 mechanical testing on the sutures.</p> <p>14 Q. And increased toughness and increased</p> <p>15 embrittlement are polar opposites of each</p> <p>16 other; is that fair?</p> <p>17 A. Yeah.</p> <p>18 Q. And if something became more tough,</p> <p>19 by definition, it becomes less brittle?</p> <p>20 A. But that's if you believe those</p> <p>21 seven-year data. They seem flawed to me. The</p> <p>22 methodology in the report is not -- there's not</p> <p>23 a lot of details, and something seems wrong.</p> <p>24 I don't understand why you can see</p>

29 (Pages 110 to 113)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 114</p> <p>1 this elongation, this increase in ductility in  2 seven years and one and two years you're not  3 seeing it.  4 Q. You've not conducted your own tests  5 to determine whether these polypropylene  6 sutures become more tough after implantation,  7 have you?  8 A. No.  9 Q. On page 6 of Exhibit No. 1 in your  10 report, you're talking about failure mechanisms  11 that you've observed in connection with  12 polyether urethanes and polyester urethanes.  13 Do you see that?  14 A. Yes.  15 Q. Is this work that you've been  16 involved in?  17 A. So the environmental stress cracking  18 of biostable polyether urethanes is primarily  19 the work of Dr. Anderson.  20 Q. Have you done any work in that  21 regard?  22 A. We've done -- in the papers I've  23 published, we've shown that these materials  24 degrade in vitro -- they degrade in vivo due to</p>	<p style="text-align: right;">Page 116</p> <p>1 generates new surface that oxidated species can  2 use and cells can migrate into and continue  3 this process of oxidative degradation. That's  4 what that's referring to.  5 Q. When you look at, under scan  6 electronic microscopy, environmental stress  7 cracking of these polyurethanes, what do you  8 see?  9 A. You see cracks in the material. I  10 don't know what you mean.  11 Q. Does it flake off? Does it break?  12 Does it propagate throughout the center of the  13 fiber?  14 MR. JACKSON: Objection to form.  15 A. It can. They're not typically  16 fibers. These are more bulk material.  17 Yeah, pacemaker lead insulation. So  18 it's a different form of the material. It's  19 not necessarily a fiber.  20 Q. (By Mr. Thomas) When you have  21 oxidative degradation in the surface of the  22 polyurethane in what you mentioned on page 6  23 of your report, does the material flake off?  24 A. It can. I don't know that it always</p>
<p style="text-align: right;">Page 115</p> <p>1 oxidative degradation, and they degrade in  2 vitro using a macrophage pocket simulating  3 fluid developed by Dr. Anderson. We see a  4 connection between those rates of degradation  5 in vitro and in vivo that led us to conclude  6 they're degrading by oxidation.  7 Q. Is the mechanism of oxidation that  8 you've observed in the polyurethanes the same  9 as the mechanism that you've suggested occurs  10 with polypropylene?  11 MR. JACKSON: Object to the form.  12 A. The difference between the two  13 polymers would be where the oxidative attack  14 takes place in the chain. So in the  15 polypropylene, it's the hydrogen on the  16 tertiary carbon that's being -- that  17 hydrogen-carbon bond is being attacked.  18 Q. (By Mr. Thomas) So the polyether  19 urethanes would undergo environmental stress  20 cracking, and then you would have subsequent  21 loss of molecular weight?  22 A. The idea is similar to what we saw in  23 the SCM images of the cracked polypropylene.  24 Once the surface starts to crack, that</p>	<p style="text-align: right;">Page 117</p> <p>1 does. That can be an outcome. Particulates.  2 Q. Does it crack down through the entire  3 body of the implant?  4 MR. JACKSON: Object to the form.  5 A. I don't know if it goes through the  6 entire body. The surface cracks, and then the  7 cracks can grow.  8 Q. (By Mr. Thomas) Does the material  9 flake off and cleave off so that you have a  10 smooth surface underneath?  11 A. I don't know. I mean -- what I'm  12 saying here is that it cracks, and then the  13 cracks generate new surface that can lead to  14 more oxidation. If pieces become embrittled,  15 it can slough off like they saw in the dog study  16 or the human explants where you end up with the  17 layer of degraded material.  18 Q. What is crack propagation?  19 A. If the crack grows.  20 Q. It's like when you put a crack in a  21 windshield and you press on it, it spreads  22 across the windshield? That's crack  23 propagation?  24 MR. JACKSON: Object to the form.</p>

30 (Pages 114 to 117)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 118</p> <p>1 A. I think that's a little different. I 2 think crack propagation would be the crack into 3 the surface can deepen. It can widen. Again, 4 once it cracks, there's two things that can 5 happen. It becomes mechanically compromised, 6 and then it generates new surface for oxidative 7 attacks. So the crack can grow and propagate 8 through the material. 9 Q. (By Mr. Thomas) In what direction 10 does the crack propagate? Does it matter? 11 A. You know, I would think it would be 12 inclined to propagate in the direction of the 13 stress. But it just depends on the loading, on 14 the type of material. 15 Q. Something that could be tested, of 16 course? 17 A. I think Ethicon looked at this too. 18 Q. I'm talking about you now, whether 19 you could test -- 20 A. I haven't done these studies. These 21 are published studies. The materials that I 22 work with are designed to be resorbable, so 23 they don't typically crack. They're resorbed 24 and replaced with new tissues.</p>	<p style="text-align: right;">Page 120</p> <p>1 the fiber length. So they report measurements 2 of crack depth. But there's no pictures. They 3 just report the numbers. 4 These were materials that were 5 implanted anywhere from two to seven and a half 6 years. 7 Q. Is that the only information that you 8 have to look to to determine the extent to 9 which cracks will propagate in polypropylene? 10 A. Let me look at the other one, the 11 human explants. 12 Q. That's Tab 18 in Exhibit 3? 13 A. Yeah. So, again, they don't provide 14 a lot of details. This is one of the documents 15 Dr. Dunn was trying to get. We don't have SEM 16 images. They have microscopy observations by 17 -- I think this is Mr. Schiller who did SEM. 18 At two years, he notes no cracking. 19 At eight years, he notes severe cracking. 20 Without the pictures, we don't know what that 21 means. But he basically says that at eight 22 years, they're severely cracked. 23 So these are the two documents that 24 I'm aware of where Ethicon was looking at</p>
<p style="text-align: right;">Page 119</p> <p>1 I haven't actually done experiments 2 of measuring crack propagation. 3 Q. So you don't know how crack 4 propagation would manifest itself in 5 polypropylene which had undergone surface 6 oxidation? 7 MR. JACKSON: Object to the form. 8 Q. (By Mr. Thomas) Is that fair? 9 A. Let me look at this document for a 10 minute. 11 Q. What are you looking at now? 12 A. This would be a memo on crack depth 13 in explanted prolene polypropylene sutures. 14 Q. This is another document that you've 15 brought here today, Tab 19 in Exhibit No. 3 16 dated June 15, 1982? 17 A. Yes. So in this study, they were 18 measuring the depth of the crack. They 19 concluded that the sutures had crack depths 20 varying from .5 to 2 microns. The diameter of 21 the suture in this case was 25 microns. 22 Crack depth does not vary 23 systematically with implantation time. It 24 varies significantly from point to point along</p>	<p style="text-align: right;">Page 121</p> <p>1 cracking of polypropylene sutures. 2 Q. My question, Doctor, are those two 3 documents, 18 and 19 in Exhibit No. 3, the sole 4 source of your understanding of what happens to 5 polypropylene when there's cracking? 6 A. Well, I think Clave also addressed 7 this, that cracking was associated with these 8 failed meshes that were either infected or 9 extruded or had other complications. 10 Q. Right. But we've covered now the 11 source of your knowledge of what happens to 12 polypropylene when it cracks. That's Clave, 13 and that's documents 18 and 19 in Deposition 14 Exhibit 3? 15 A. Those are the studies that I'm aware 16 of. 17 Q. On page 7 of your report in the 18 middle of the page, there's a paragraph that 19 begins, While the addition of stabilizers to 20 polypropylene. You reference a figure 2(a). 21 A. That should be figure 1(a). I think 22 that's an error. I don't know that I have a 23 figure 2 in this report. 24 Q. So figure 1(a) goes back to page 5?</p>

31 (Pages 118 to 121)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 122</p> <p>1 A. That's right.</p> <p>2 Q. All right. The last sentence of that</p> <p>3 paragraph begins, At this embrittlement stage,</p> <p>4 the elongation of the polymer decreases</p> <p>5 substantially. Does that mean the fiber itself</p> <p>6 shrinks?</p> <p>7 A. No. The elongation is the Y axis on</p> <p>8 this plot. So the percent elongation is the</p> <p>9 longest distance you can stretch it before it</p> <p>10 breaks. So it starts off around 800 percent</p> <p>11 elongation. You could stretch it out to eight</p> <p>12 times its initial length.</p> <p>13 So then when it becomes embrittled</p> <p>14 even at very small strains, the material fails</p> <p>15 because it's become embrittled.</p> <p>16 Q. Which leads to adverse events after</p> <p>17 implantation such as extrusion and chronic pain</p> <p>18 caused by sclerosis. What is sclerosis?</p> <p>19 A. Sclerosis would be hardening of the</p> <p>20 implant in the tissue.</p> <p>21 Q. This is the same phenomenon we talked</p> <p>22 about a few minutes ago?</p> <p>23 A. Yes.</p> <p>24 Q. Dr. Guelcher, if there's no reduction</p>	<p style="text-align: right;">Page 124</p> <p>1 So what I would say is if you took</p> <p>2 the entire suture and measured -- it depends on</p> <p>3 what you're probing and measuring. If you're</p> <p>4 measuring the molecular weight of the entire</p> <p>5 suture, because the surface layer doesn't</p> <p>6 represent the entire volume, you may not see a</p> <p>7 difference.</p> <p>8 But by actually probing that surface</p> <p>9 layer like they did in this experiment, you</p> <p>10 would see that it has a lower molecular weight.</p> <p>11 But if you measure the bulk molecular weight,</p> <p>12 you may not see it.</p> <p>13 That's what I was saying is you would</p> <p>14 use -- molecular weight measurements are very</p> <p>15 effective and useful. It's just you have to</p> <p>16 make sure you're sampling the degraded region</p> <p>17 of the polymer correctly.</p> <p>18 Q. If you go back to page 5 of your</p> <p>19 report --</p> <p>20 A. Right.</p> <p>21 Q. -- you have more than a 20 percent</p> <p>22 reduction in molecular weight before you have</p> <p>23 embrittlement, don't you?</p> <p>24 A. Yes. That was a film, you know, so</p>
<p style="text-align: right;">Page 123</p> <p>1 in molecular weight, would you agree that</p> <p>2 there's no degradation of the polypropylene?</p> <p>3 MR. JACKSON: Object to the form.</p> <p>4 A. Again, I think this is a more complex</p> <p>5 question. When you measure the molecular</p> <p>6 weight, you're measuring the molecular weight</p> <p>7 of the entire material. So if the degradation</p> <p>8 is occurring at the surface, you may not see</p> <p>9 it.</p> <p>10 It's difficult to probe. So I guess</p> <p>11 the way I want to answer that is if I go back</p> <p>12 to the -- if I go back to the Ethicon human</p> <p>13 implant results where they noted --</p> <p>14 Q. That's Tab 18?</p> <p>15 A. I believe it's Tab 18. If I go back</p> <p>16 to that one, they mentioned the cracked</p> <p>17 surfaces were easily wiped off and deposited on</p> <p>18 a KBR window for IR. The surface scrapings had</p> <p>19 the handling consistency of a waxy snow.</p> <p>20 Then they noted that the surface</p> <p>21 scrapings were melted at 147 and 156 degrees on</p> <p>22 a hot stage, and this is the melting range</p> <p>23 previously observed for oxidatively degraded</p> <p>24 polypropylene.</p>	<p style="text-align: right;">Page 125</p> <p>1 it's a different -- it's different than -- I</p> <p>2 mean, these experiments were specifically</p> <p>3 designed to test this idea. So I don't know</p> <p>4 that you would necessarily see the same thing</p> <p>5 in a suture.</p> <p>6 Q. Okay. You've not tested it in a</p> <p>7 suture?</p> <p>8 A. No. I guess what I'm saying is</p> <p>9 molecular weight -- to clear up what I was</p> <p>10 saying earlier, molecular weight is very</p> <p>11 important. It's just sampling that degraded</p> <p>12 layer by molecular weight analysis can be very</p> <p>13 difficult to do. That's why we like methods</p> <p>14 like XPS because you can use smaller amounts.</p> <p>15 MR. THOMAS: Let's go off the record</p> <p>16 for a second.</p> <p>17 (A break was taken from 12:27 to 1:43</p> <p>18 p.m.)</p> <p>19 Q. (By Mr. Thomas) Dr. Guelcher, has</p> <p>20 Dr. Dunn submitted any invoices for your time</p> <p>21 in this case yet?</p> <p>22 A. I don't know if he's submitted</p> <p>23 invoices to the attorneys. I've submitted</p> <p>24 invoices to him, but I don't know that he's</p>

32 (Pages 122 to 125)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 126</p> <p>1 submitted them to the attorneys.  2 Q. How many invoices have you submitted?  3 A. I believe one.  4 Q. Okay.  5 A. I can't remember.  6 Q. If you look at Exhibit No. 1, which  7 is your expert report in this case, how much  8 time did you have in this case prior to the  9 time that you completed Exhibit No. 1?  10 MR. JACKSON: Object to the form.  11 A. I don't remember.  12 Q. (By Mr. Thomas) The time that you  13 have in this case prior to the time that you  14 completed Exhibit No. 1 would be reflected in  15 your billing records?  16 A. I believe it would.  17 Q. Okay. From the time that you  18 completed Exhibit No. 1, what additional work  19 have you done in this matter since that time?  20 A. I reviewed the documents. I wrote  21 the rebuttal report. I met with the attorneys  22 and Dr. Dunn to discuss the documents.  23 Q. Now, the documents that you've  24 reviewed after Exhibit No. 1, what documents</p>	<p style="text-align: right;">Page 128</p> <p>1 No. 3. When did you review the documents in  2 Exhibit No. 3?  3 A. Last week.  4 Q. Okay. And the documents in Exhibit  5 No. 3 is your best effort at identifying all  6 the documents upon which you rely for your  7 rebuttal report which is Exhibit No. 5 that I  8 got this morning; correct?  9 A. Right.  10 Q. All right. Now, other than reviewing  11 the documents for Exhibit No. 2 and the  12 documents for Exhibit No. 3, what other work  13 have you done in this case?  14 A. Well, I wrote the reports.  15 Q. Right.  16 A. I reviewed the documents. I --  17 Q. When you say you reviewed the  18 documents, is your review limited to the  19 documents in Exhibits 2 and 3?  20 A. There were other documents I went  21 through as well. They're all listed -- all the  22 reliance documents that are listed in the  23 report. I mean, they're all --  24 Q. That's where I want to ask you about</p>
<p style="text-align: right;">Page 127</p> <p>1 were those?  2 A. Well, the ones in Exhibit No. 3, I  3 guess. Yeah, this one.  4 Q. The documents that are in Exhibit  5 No. 2 are the documents that go with your first  6 report; correct?  7 A. Yes. I reviewed those again too.  8 Q. Did you review those before you did  9 your report?  10 A. Yeah. I mean, I wrote the report  11 from those documents. I can't remember how  12 much I reviewed every one, but they were all  13 part of the --  14 Q. Again, the goal of the deposition  15 Exhibit No. 2 is to capture all the documents  16 upon which you relied for the opinions you  17 express in your original report; correct?  18 MR. JACKSON: Object to the form.  19 A. Yes.  20 Q. (By Mr. Thomas) After you completed  21 your original report, reviewed the documents  22 that were in Exhibit No. 2, you said that you  23 reviewed additional documents. We've talked  24 earlier today about the documents in Exhibit</p>	<p style="text-align: right;">Page 129</p> <p>1 it. If you go to page 11 of Exhibit No. 1, it  2 says in the second sentence, In addition to my  3 knowledge, skill, training, and experience as  4 an engineer, the following depositions of  5 Ethicon employees and the exhibits thereto were  6 supplied to me. And then there's a list of  7 people.  8 Did you read all those depositions?  9 A. No. I didn't read all of them.  10 Q. Do you know of any of them that you  11 read?  12 A. I reviewed parts of Dr. Burkley's. I  13 think that's the main one I reviewed.  14 Q. Any others in the first paragraph  15 there that you recall reviewing?  16 A. Not that I can remember.  17 Q. The reason why you reviewed  18 Dr. Burkley was to understand the work he did  19 on the seven-year dog study?  20 A. Primarily, yeah.  21 Q. Any other reason that you can recall?  22 A. He was the scientist at Ethicon that  23 had done most of the work on in vivo  24 performance of the polypropylene, the dog</p>

33 (Pages 126 to 129)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 130</p> <p>1 study.</p> <p>2 Q. The next paragraph says, I've also</p> <p>3 considered the following material identified in</p> <p>4 Exhibit B.</p> <p>5 Again, there are documents in</p> <p>6 Exhibit B that aren't in your two notebooks;</p> <p>7 correct?</p> <p>8 A. Yeah, I think so.</p> <p>9 Q. And is it fair to understand that to</p> <p>10 the extent you identified documents that were</p> <p>11 important to your opinions, you put those in</p> <p>12 your notebooks, Exhibits 2 and 3?</p> <p>13 A. Right.</p> <p>14 Q. In addition, the following Rule 26</p> <p>15 reports were supplied to me, and a list of</p> <p>16 people. These reports were provided after we</p> <p>17 had reached my opinions in this case.</p> <p>18 Did you review any of those Rule 26</p> <p>19 reports?</p> <p>20 A. No, not much, I don't think.</p> <p>21 Q. There's nothing in those Rule 26</p> <p>22 reports that have any bearing on the opinions</p> <p>23 that you're giving today as far as you know?</p> <p>24 A. No.</p>	<p style="text-align: right;">Page 132</p> <p>1 Q. Do you know when trial is scheduled</p> <p>2 in this case?</p> <p>3 A. I don't.</p> <p>4 Q. Compensation is listed at \$275 an</p> <p>5 hour for review and study, \$350 per hour for</p> <p>6 deposition and trial testimony time.</p> <p>7 How much time have you billed</p> <p>8 Dr. Dunn for, as of today?</p> <p>9 A. I don't remember how many it's been.</p> <p>10 Q. Have you been paid yet?</p> <p>11 A. I can't remember when I submitted the</p> <p>12 reports. I may have been paid something for</p> <p>13 writing a report, but I can't remember when</p> <p>14 those invoices were submitted.</p> <p>15 Q. Are you paid yourself \$275 an hour,</p> <p>16 or is that time that's billed to Dr. Dunn's</p> <p>17 company and you're paid something different?</p> <p>18 A. So Dr. Dunn bills all the effort at</p> <p>19 275 or 350 through his company, and he pays me</p> <p>20 200 as a subcontractor through his company. So</p> <p>21 I'm not an employee, but I'm a subcontractor of</p> <p>22 his company.</p> <p>23 Q. Okay. So you receive \$200 an hour</p> <p>24 whether it's review and study or whether it's</p>
<p style="text-align: right;">Page 131</p> <p>1 MR. JACKSON: Objection to form.</p> <p>2 Q. (By Mr. Thomas) Down in heading</p> <p>3 No. 5, it talks about exhibits which I plan to</p> <p>4 use as a summary of or in support of opinions?</p> <p>5 A. Right.</p> <p>6 Q. What photographs do you plan to use?</p> <p>7 A. Yeah. I don't have any photographs.</p> <p>8 I don't have FTIR studies, and I don't have</p> <p>9 exemplar TVT. Dr. Dunn may have. I don't have</p> <p>10 those. I didn't rely on those for this report.</p> <p>11 It was the Ethicon documents and the</p> <p>12 papers that we've been talking about, but not</p> <p>13 the first two.</p> <p>14 Q. Other than the graphics in your</p> <p>15 report, are there any other exhibits extracted</p> <p>16 from the materials that you reviewed or</p> <p>17 excerpts from learned treatises and literature</p> <p>18 that you know that you'll use as an exhibit at</p> <p>19 trial in this case?</p> <p>20 A. I don't know. I mean, I haven't</p> <p>21 thought about preparing for trial. So I don't</p> <p>22 know what -- I mean, I could use information in</p> <p>23 those papers to prepare slides. It's hard to</p> <p>24 say, not having done that.</p>	<p style="text-align: right;">Page 133</p> <p>1 deposition and trial time?</p> <p>2 A. It's \$200 for review and study and</p> <p>3 275 for deposition and trial testimony.</p> <p>4 Q. When you and Dr. Dunn discussed</p> <p>5 working on the Ethicon mesh cases, and you</p> <p>6 decided between the two of you the scope of the</p> <p>7 work that you would do, what was the scope of</p> <p>8 the work that Dr. Dunn would do?</p> <p>9 MR. JACKSON: I'm going to object as</p> <p>10 asked and answered.</p> <p>11 A. I can't speak for Dr. Dunn, but</p> <p>12 certainly he has expertise in polymer science.</p> <p>13 So I think he's speaking to the auto-oxidation</p> <p>14 of polypropylene.</p> <p>15 He has expertise in product design.</p> <p>16 So he was looking at failure modes and effects</p> <p>17 analysis. He was looking more at those</p> <p>18 questions.</p> <p>19 Q. (By Mr. Thomas) Did you share your</p> <p>20 report with Dr. Dunn before you finalized it?</p> <p>21 A. I don't remember. I know I sent him</p> <p>22 a copy of the final one. We've discussed it,</p> <p>23 but I don't know if I sent a draft or something</p> <p>24 to him.</p>

34 (Pages 130 to 133)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 134</p> <p>1 Q. Did you discuss your work on your 2 initial report with Dr. Dunn as you were doing 3 the work? 4 A. I believe so. I don't quite remember 5 what we talked about prior to writing the 6 report. 7 Q. When you wanted materials to review 8 in connection with the work that you were doing 9 in this project, did you speak with Dr. Dunn or 10 to counsel? 11 A. I spoke with Dr. Dunn. Dr. Dunn, 12 through his company, handles all those types of 13 transfers with counsel. 14 Q. Are you currently engaged in any 15 projects with Dr. Dunn and any other expert in 16 this litigation that is a research project on 17 meshes used in the pelvic floor? 18 A. So are you talking expert witness in 19 litigation, or are you talking about research 20 projects? 21 Q. Research projects. 22 A. We are. 23 Q. And how many projects? 24 A. With Dr. Dunn, there's one.</p>	<p style="text-align: right;">Page 136</p> <p>1 Q. Are they all AMS meshes? 2 A. I believe they are. 3 Q. And where did you obtain the meshes? 4 A. From Dr. Iakovlev. 5 Q. Do you know where he obtained them? 6 A. I'm not exactly sure. I mean, they 7 came from the hospital, I believe, that treated 8 the patient. But I don't know exactly which 9 hospital. I don't remember. 10 Q. Are you and Dr. Dunn in possession of 11 the explants now? 12 A. I don't know. Dr. Bridget Rogers at 13 Vanderbilt ran the XPS maybe a month ago. I 14 don't know who has them now, if we still have 15 them or if he sent them back. 16 Q. Who handled the meshes when they were 17 here at Vanderbilt? 18 A. I believe Dr. Rogers. 19 Q. Do you know how the explants were 20 received, in what form? 21 A. They were received as dried fibers. 22 Q. Do you know who was responsible for 23 the preparation of the explanted mesh samples? 24 A. Dr. Iakovlev.</p>
<p style="text-align: right;">Page 135</p> <p>1 Q. And are there projects with other 2 experts? 3 A. There is. There's a project with 4 Dr. Iakovlev. 5 Q. What is the project with Dr. Dunn? 6 A. The project with Dr. Dunn is looking 7 at the characterization of explanted mesh and 8 also the in vitro degradation of mesh for 9 polypropylene. 10 Q. In vitro degradation? 11 A. Right. 12 Q. And what kind of explanted mesh are 13 you characterizing? 14 A. Well, it's from one of the AMS cases. 15 It's polypropylene mesh. I don't remember the 16 exact name of it, but it's a name that's broad. 17 Q. What's the nature of the work that 18 you're doing? 19 A. We're characterizing the surface of 20 the material by XPS. 21 Q. How many explanted meshes do you 22 have? 23 A. There are several. I don't remember 24 the exact number.</p>	<p style="text-align: right;">Page 137</p> <p>1 Q. Did you have any -- do you and 2 Dr. Dunn have any involvement in how those 3 samples will be prepared for XPS testing? 4 A. Yes. We discussed that with 5 Dr. Iakovlev. 6 Q. What kind of parameters did you 7 discuss with Dr. Iakovlev about preparation of 8 these samples? 9 A. We talked about this earlier. I 10 believe they were shipped in saline and then 11 desiccated by Dr. Iakovlev. And then one group, 12 he sent desiccated; another group, he scraped 13 off the degraded material on the surface. 14 Q. What is the question that you and 15 Dr. Dunn are trying to answer by characterizing 16 these explanted meshes? 17 A. We're looking for evidence of bound 18 oxygen on the surface that would be indicative 19 of oxidation of the polypropylene mesh. 20 Q. Is XPS the only test that you're 21 conducting on these explanted meshes? 22 A. That's all we've done so far. We're 23 considering others. But so far, we've done 24 XPS.</p>

35 (Pages 134 to 137)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 138</p> <p>1 Q. And what will the XPS hopefully show?</p> <p>2 What will this test tell you about the</p> <p>3 explanted meshes?</p> <p>4 MR. JACKSON: Object to form.</p> <p>5 A. Well, it would tell you whether</p> <p>6 there's oxygen bound with carbon on the</p> <p>7 surface.</p> <p>8 Q. (By Mr. Thomas) Is it able to</p> <p>9 quantify or just detect presence?</p> <p>10 A. Quantify.</p> <p>11 Q. And in what amounts or quantification</p> <p>12 would the oxygen bound to carbon be significant</p> <p>13 in the analysis of oxidation of explanted mesh?</p> <p>14 A. Any oxygen would be significant. As</p> <p>15 Fayolle teaches, it doesn't take much on the</p> <p>16 surface to catalyze the oxidation of the</p> <p>17 material.</p> <p>18 Oxygen shouldn't be there. It's a</p> <p>19 hydrocarbon. So any bound oxygen in the</p> <p>20 material would have to be a result of</p> <p>21 oxidation. So anything that we found would be</p> <p>22 significant.</p> <p>23 Q. What efforts were made to clean the</p> <p>24 mesh prior to the XPS testing to remove any</p>	<p style="text-align: right;">Page 140</p> <p>1 Q. Is that the full scope of the work</p> <p>2 that you and Dr. Dunn are doing?</p> <p>3 A. As of right now.</p> <p>4 Q. Do you have plans to do additional</p> <p>5 work?</p> <p>6 A. I don't know. We're still discussing</p> <p>7 it.</p> <p>8 Q. Who was involved in this project</p> <p>9 other than you and Dr. Dunn?</p> <p>10 A. Dr. Iakovlev.</p> <p>11 Q. Who is funding this project?</p> <p>12 A. We're discussing that right now.</p> <p>13 Q. Is anybody funding it now?</p> <p>14 A. The explant work was paid for by the</p> <p>15 litigation.</p> <p>16 Q. Does that mean you've received</p> <p>17 payment from counsel for the plaintiffs in the</p> <p>18 AMS litigation?</p> <p>19 A. Dr. Rogers did for the XPS</p> <p>20 experiments.</p> <p>21 Q. Any other source of payments? Have</p> <p>22 you received any compensation for your work on</p> <p>23 this project?</p> <p>24 A. Yes. I mean, it's billed, but I</p>
<p style="text-align: right;">Page 139</p> <p>1 other materials that didn't belong there?</p> <p>2 A. Well, we discussed that too. So</p> <p>3 Dr. Iakovlev mainly desiccated the residual</p> <p>4 tissue. And then one group he sent that had</p> <p>5 just been desiccated, and the other group he</p> <p>6 scraped to make sure that all the tissue was</p> <p>7 gone.</p> <p>8 Q. I believe you also said that you were</p> <p>9 looking at in vitro degradation as part of this</p> <p>10 project?</p> <p>11 A. Yes.</p> <p>12 Q. Tell me how that fits into your work.</p> <p>13 A. I've published two papers on</p> <p>14 biomaterials in the last several years where</p> <p>15 we -- Dr. Anderson reported a number of years</p> <p>16 ago of fluid that's used to simulate the</p> <p>17 macrophage pocket. So you can immerse the</p> <p>18 biomaterial in this fluid, and it's similar to</p> <p>19 essentially bathing the material in the</p> <p>20 macrophage. So we're considering doing those</p> <p>21 experiments as well.</p> <p>22 I've published a couple of papers on</p> <p>23 that with polyurethane where we're able to show</p> <p>24 that it degrades in vitro.</p>	<p style="text-align: right;">Page 141</p> <p>1 didn't actually do the XPS experiments. I've</p> <p>2 discussed them with Dr. Rogers and Dr. Dunn,</p> <p>3 and I included it in other reports. So I've</p> <p>4 been paid for that part of it.</p> <p>5 Q. Okay. And is the research project</p> <p>6 that you're doing with Dr. Iakovlev different</p> <p>7 than the one you're doing with Dr. Dunn?</p> <p>8 A. Dr. Iakovlev's project relates to a</p> <p>9 number of polypropylene explant materials.</p> <p>10 They come from a variety of sources like hernia</p> <p>11 mesh, pelvic floor mesh, where he sees the</p> <p>12 surface degradation, primarily focusing on</p> <p>13 histology and microscopic assessment. So it's</p> <p>14 more qualitative pathology-focused.</p> <p>15 Q. Who is working with you and</p> <p>16 Dr. Iakovlev on that project?</p> <p>17 A. Dr. Dunn is involved as well, not as</p> <p>18 much.</p> <p>19 Q. And how many explants are involved in</p> <p>20 this project?</p> <p>21 A. I'm not sure. It's more than ten, I</p> <p>22 think. I don't remember the number.</p> <p>23 Q. Do you know whether any Ethicon</p> <p>24 explants are involved?</p>

36 (Pages 138 to 141)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 142</p> <p>1 A. I don't.</p> <p>2 Q. What is Dr. Dunn doing on this</p> <p>3 project?</p> <p>4 MR. JACKSON: Object to the form.</p> <p>5 A. Mostly consulting.</p> <p>6 Q. (By Mr. Thomas) What are you doing</p> <p>7 on this project?</p> <p>8 A. I had some discussions with</p> <p>9 Dr. Iakovlev about staining for things like</p> <p>10 myeloperoxidase to show evidence of active</p> <p>11 macrophages at the site, similar to what I've</p> <p>12 done with the other materials I've worked with.</p> <p>13 Q. What would the staining of the meshes</p> <p>14 to show active macrophages at the site show</p> <p>15 you?</p> <p>16 A. It would show that there's secretion</p> <p>17 of myeloperoxidase, which is an enzyme that is</p> <p>18 involved in these reactive oxygen species. So</p> <p>19 it would show the presence of that enzyme and</p> <p>20 provide evidence that macrophages are at the</p> <p>21 material surface secreting these reactive</p> <p>22 oxygen species that can promote oxidation of</p> <p>23 the polymer.</p> <p>24 Q. What's the status of the work that</p>	<p style="text-align: right;">Page 144</p> <p>1 A. It's a presubmission inquiry, so it's</p> <p>2 basically an abstract of figures.</p> <p>3 Q. So there has been work conducted and</p> <p>4 data collected so far?</p> <p>5 A. Yes.</p> <p>6 Q. That's what I want to know. What</p> <p>7 kind of work have you done and data you've</p> <p>8 collected for this project?</p> <p>9 A. Well, so Dr. Iakovlev did the data</p> <p>10 collection. There's histological staining,</p> <p>11 staining of histological sections. There's</p> <p>12 microscopy showing the presence of a degraded</p> <p>13 layer on the surface.</p> <p>14 Q. Is that light microscopy or SCM?</p> <p>15 A. Both, polarized light microscopy,</p> <p>16 SCM. There's another type of imaging technique</p> <p>17 he used as well. It's all imaging in</p> <p>18 histology.</p> <p>19 Q. What is the question that this paper</p> <p>20 seeks to answer?</p> <p>21 MR. JACKSON: Object to the form,</p> <p>22 asked and answered.</p> <p>23 A. Well, the paper is directed toward</p> <p>24 providing evidence that polypropylene degrades</p>
<p style="text-align: right;">Page 143</p> <p>1 you're doing with Dr. Iakovlev on these</p> <p>2 polypropylene explant materials?</p> <p>3 A. He submitted a presubmission inquiry</p> <p>4 to Nature Biotech.</p> <p>5 Q. I'm sorry, I don't know what that</p> <p>6 means.</p> <p>7 A. Nature Biotechnology is a scientific</p> <p>8 journal. Dr. Iakovlev submitted a</p> <p>9 presubmission inquiry regarding its suitability</p> <p>10 for publication in that journal. As far as I</p> <p>11 know, he's waiting to hear from the editor.</p> <p>12 Q. Has any work been conducted on this</p> <p>13 project while this request is pending?</p> <p>14 A. Not in the past week or two. We've</p> <p>15 been waiting to hear back.</p> <p>16 Q. Prior to that time, had you done any</p> <p>17 initial work on analyzing these polypropylene</p> <p>18 explant materials?</p> <p>19 A. No. I assisted Dr. Iakovlev with</p> <p>20 writing, editing the draft.</p> <p>21 Q. The draft request?</p> <p>22 A. The manuscript, yeah, the</p> <p>23 presubmission inquiry.</p> <p>24 Q. Is there a manuscript in draft?</p>	<p style="text-align: right;">Page 145</p> <p>1 in vivo by an oxidative mechanism.</p> <p>2 Q. (By Mr. Thomas) And who has funded</p> <p>3 the project with Dr. Iakovlev?</p> <p>4 A. I don't know. I think some of the</p> <p>5 samples have been evaluated in the course of</p> <p>6 the litigation. So certainly his time would be</p> <p>7 paid for by the attorneys, plaintiffs'</p> <p>8 attorneys. But I don't know the details of</p> <p>9 that.</p> <p>10 Q. How much time have you spent on this</p> <p>11 project with Dr. Iakovlev?</p> <p>12 A. Maybe ten hours or so. It's hard to</p> <p>13 say.</p> <p>14 Q. Have you been paid for your time in</p> <p>15 that project?</p> <p>16 A. For parts of it. So I visited</p> <p>17 Dr. Iakovlev in Toronto as part of the pending</p> <p>18 litigation. I was paid for that. But for</p> <p>19 writing the paper, I can't remember if I</p> <p>20 charged for that or not.</p> <p>21 Q. What responsibility did you have for</p> <p>22 the writing of the paper?</p> <p>23 A. Well, Dr. Iakovlev wrote the draft.</p> <p>24 I edited it. It talks more specifically about</p>

37 (Pages 142 to 145)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 146</p> <p>1 surface degradation. Dr. Iakovlev is a 2 pathologist, so my contribution is more on the 3 material science, chemistry, the things 4 described in my report. 5 Q. The work that you and Dr. Dunn are 6 doing with the AMS polypropylene explants where 7 you're analyzing the surface of the material by 8 XPS, are there plans to publish that research? 9 A. We would like to publish it, but 10 we're not as far along as Dr. Iakovlev is. 11 Q. What laboratory is doing the imaging 12 that Dr. Iakovlev is doing for the 13 polypropylene explant materials? 14 A. I don't know where he's doing it. I 15 presume he's doing it at his university in 16 Toronto. 17 Q. Is any of the work on the explanted 18 meshes in the polypropylene explant study by 19 Dr. Iakovlev being done at Vanderbilt? 20 A. No. 21 Q. And the XPS work and the work with 22 Dr. Dunn has been done by Dr. Rogers at 23 Vanderbilt? 24 A. Yes, that's right.</p>	<p style="text-align: right;">Page 148</p> <p>1 on another one. But that's what I've got 2 at this point. 3 Q. (By Mr. Thomas) Let's go back to 4 your original report, page 8, the paragraph 5 that begins, Finally with respect to the idea, 6 the next sentence reads, These stresses cannot 7 only act as catalysts for oxidative 8 degradation, they can alter the properties of 9 the mesh itself. 10 What properties of the mesh are 11 changed by the stresses that you discuss in 12 that paragraph? 13 A. I'm just going to read it again. 14 Q. Sure. 15 A. I think what I'm saying here is that 16 the antioxidants basically guard against -- 17 antioxidants are designed to protect against 18 oxidation. So mechanical stresses on the 19 material can sort of exacerbate these effects. 20 Mechanical loading of the mesh pelvic 21 floor environment is different, say, than the 22 suture. That can cause changes in the 23 degradation and response of the material. 24 That's what I'm really trying to say there.</p>
<p style="text-align: right;">Page 147</p> <p>1 Q. Are you involved in any research or 2 projects to identify a better material for use 3 as a medical device in the pelvic floor? 4 A. No. 5 Q. Have you done any work in this 6 litigation about a suitable alternative device 7 for the treatment of stress urinary 8 incontinence that is equally safe and effective 9 as the Ethicon TVT device? 10 MR. JACKSON: Objection to form. 11 A. Again, I was -- my report, my intent 12 was to review the in vivo performance of 13 polypropylene and not look at alternative 14 devices. 15 MR. THOMAS: Am I going to get the 16 time sheets today? 17 MR. JACKSON: I'm actually waiting on 18 a response to my e-mail. But the last I 19 heard is that these were included in our 20 objections to the request for production 21 attached to the deposition. 22 MR. THOMAS: Really? 23 MR. JACKSON: That's the last 24 response I got, but I am actually waiting</p>	<p style="text-align: right;">Page 149</p> <p>1 Q. Help me out a little bit. I don't 2 really understand that. They can alter the 3 properties of the mesh. What properties of the 4 mesh can be altered? 5 A. Strength. It's elongation. These 6 changes in the polypropylene are happening over 7 time. They can change as mechanical properties 8 which is toughness, embrittlement, these things 9 we've been talking about. 10 Q. Does it include tensile strength? 11 A. Yeah. Tensile strength would be 12 another mechanical property that could change 13 over time due to oxidative changes. 14 Q. Okay. So you have tensile strength, 15 you have elongation, you have toughness. What 16 other physical properties of the mesh can be 17 altered by oxidative degradation? 18 A. I think basically it's the 19 embrittlement -- it's going to become more 20 brittle, less tough. The strength could 21 change. Those are the -- that's what I think 22 of when I think of embrittlement. 23 Q. Are those the results of the 24 oxidative degradation that you discuss in this</p>

38 (Pages 146 to 149)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 150</p> <p>1 paper?</p> <p>2 A. Yes.</p> <p>3 Q. It's those changes in the physical</p> <p>4 properties that you just identified that</p> <p>5 compromise the ability of the mesh to perform</p> <p>6 its function in the body; is that fair?</p> <p>7 A. Yes. I believe that those changes</p> <p>8 in -- the changes in the composition of the</p> <p>9 polymer due to the oxidation combined with</p> <p>10 mechanical forces in the environment of the</p> <p>11 pelvic floor can cause the mesh to change over</p> <p>12 time.</p> <p>13 Q. And it's those changes in strength,</p> <p>14 elongation, toughness, embrittlement that you</p> <p>15 conclude compromise the ability of the mesh to</p> <p>16 perform its function in the pelvic floor?</p> <p>17 A. I think that's part of it.</p> <p>18 Q. What else is there?</p> <p>19 A. I think as I've been saying in the</p> <p>20 report, it's really the embrittlement of the</p> <p>21 mesh is what's causing it to change over time</p> <p>22 and lead to extrusion and these types of</p> <p>23 problems.</p> <p>24 Q. Anything else?</p>	<p style="text-align: right;">Page 152</p> <p>1 in the lab.</p> <p>2 Q. The reason why you keep MSDS sheets</p> <p>3 for materials in the lab is in the event</p> <p>4 somebody in the lab is exposed to that material</p> <p>5 while handling it; correct?</p> <p>6 MR. JACKSON: Objection to form.</p> <p>7 Q. (By Mr. Thomas) Is that true?</p> <p>8 A. Yeah. That's why we have them.</p> <p>9 Q. The reason why you have the material</p> <p>10 safety data sheets is not to determine what the</p> <p>11 clinical impact of implanting those materials</p> <p>12 may be in the human body?</p> <p>13 A. I think it's something that should be</p> <p>14 considered. I mean, if it says on the MSDS</p> <p>15 it's incompatible with strong oxidizers and you</p> <p>16 know that part of the cellular response is</p> <p>17 materials that secrete strong oxidizers, that's</p> <p>18 something that should be considered.</p> <p>19 Q. In your judgment, what does a strong</p> <p>20 oxidizer mean? What's relevant in terms of</p> <p>21 strong for purposes of degradation to</p> <p>22 polypropylene mesh?</p> <p>23 A. Well, molecular oxygen will oxidize</p> <p>24 polypropylene at elevated temperatures.</p>
<p style="text-align: right;">Page 151</p> <p>1 A. I think that's . . .</p> <p>2 Q. Let's go to page 10 of your report,</p> <p>3 please. When you're considering the use of a</p> <p>4 biomaterial for implantation in a human body,</p> <p>5 do you consult that material safety data sheet?</p> <p>6 A. That's one piece of information. The</p> <p>7 materials that I'm making, we don't -- they're</p> <p>8 experimental. So we don't have material safety</p> <p>9 data sheets.</p> <p>10 But for an established material like</p> <p>11 polypropylene, that's one factor I would look</p> <p>12 at, is what the MSDS is saying about the</p> <p>13 material.</p> <p>14 Q. Is it normally part of your business</p> <p>15 when you start working with a material that's</p> <p>16 going to be implanted in the human body, is it</p> <p>17 your practice to go to the material safety data</p> <p>18 sheet to see what it says about that material?</p> <p>19 MR. JACKSON: Object to the form.</p> <p>20 A. That's typically what we do whether</p> <p>21 it's in the human body or not. If we're using</p> <p>22 it in the laboratory if there's a possibility</p> <p>23 of someone being exposed to it, we keep a file</p> <p>24 of the MSDSs for all the materials we're using</p>	<p style="text-align: right;">Page 153</p> <p>1 Stronger oxidizers such as hypochloric acid and</p> <p>2 peroxides listed here are stronger oxidizing</p> <p>3 agents than chlorine.</p> <p>4 These are all stronger oxidizing</p> <p>5 agents than molecular oxygen. That's what I'm</p> <p>6 referring to when I say reactive oxygen</p> <p>7 species.</p> <p>8 Q. What strength chlorine is required to</p> <p>9 degrade polypropylene that has antioxidants</p> <p>10 added to it?</p> <p>11 MR. JACKSON: Objection to form.</p> <p>12 A. I mean, that's the problem with</p> <p>13 designing these implants for permanent</p> <p>14 implantation. It's very difficult to predict</p> <p>15 what dose of antioxidant is going to be</p> <p>16 required to protect every patient from this</p> <p>17 oxidation.</p> <p>18 Q. (By Mr. Thomas) Do you have an</p> <p>19 opinion about how much chlorine would be</p> <p>20 required to degrade Prolene polypropylene</p> <p>21 that's been treated with an antioxidant</p> <p>22 package?</p> <p>23 MR. JACKSON: Objection to form.</p> <p>24 A. I think you can't just parse out.</p>

39 (Pages 150 to 153)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 154</p> <p>1 These are reactive oxygen species. There's a  2 number of different molecules that are secreted  3 by inflammatory cells that have been shown in  4 Ethicon studies and in published papers to  5 cause surface degradation of polypropylene.  6 So we know that what the cells  7 secrete is enough to oxidize the propylene.  8 It's been observed in several studies.  9 Q. My question is a little different.  10 Do you have an opinion as to the amount of any  11 of these materials, strong oxidizers such as  12 chlorine, peroxides, etc., that are necessary  13 and sufficient to cause the oxidation of  14 Prolene polypropylene?  15 MR. JACKSON: Objection to form.  16 A. My answer would be that macrophages  17 secrete sufficient amounts of these molecules.  18 I mean, we know this because it's been  19 observed.  20 I don't know that anybody has  21 measured or I don't know how you would measure  22 the exact concentration. It's really  23 irrelevant. It's not being done outside the  24 body. It's being -- you know, Dr. Anderson has</p>	<p style="text-align: right;">Page 156</p> <p>1 THE WITNESS: Yeah. It's in my  2 paper.  3 MR. JACKSON: It's referenced as  4 footnote 9.  5 THE WITNESS: Yeah. It says  6 "document not available."  7 A. I'm just checking Anderson's review  8 to see if he tells what it is in here as well.  9 Well, I don't remember the exact  10 composition of the solution. But he's  11 published a number of papers, and we've used it  12 as well. It's a fluid that can be used to  13 simulate the macrophage pocket in vitro.  14 Q. (By Mr. Thomas) That's in the  15 context of the polypropylene?  16 A. No. Other people have cited this as  17 well. It's an in vitro model for oxidative  18 degradation.  19 Q. You've talked about Dr. Anderson many  20 times. The one study that we've marked -- is  21 it cited in your paper?  22 A. It's No. 8.  23 Q. Is it Exhibit 8?  24 A. I don't know what the exhibit is.</p>
<p style="text-align: right;">Page 155</p> <p>1 published this solution that's been shown to  2 simulate the composition of that macrophage  3 pocket.  4 But, again, it's a very complex  5 reaction. There's a number of species  6 involved.  7 Q. One of the things you would like to  8 know is the amount of oxidizers that may  9 compromise polypropylene so that you can modify  10 your additive package to resist that oxidation;  11 fair?  12 MR. JACKSON: Object to the form.  13 A. Dr. Anderson has come the closest to  14 describing it as a mixture of cobalt and  15 peroxide that simulates -- I've published a few  16 papers on this.  17 Q. (By Mr. Thomas) You have or he has?  18 A. Well, I have. I don't know if my  19 paper is in here or not. It may not be.  20 Dr. Anderson is the first to publish it. It's  21 not in here. Let's see if it's in the other  22 one.  23 MR. JACKSON: Are you looking for  24 your publications?</p>	<p style="text-align: right;">Page 157</p> <p>1 It's No. 6.  2 Q. Have you worked with Dr. Anderson  3 before?  4 A. I've not worked with him. I know him  5 professionally.  6 Q. Okay. So when you cite to  7 Dr. Anderson, it's based on your knowledge of  8 his studies and conversations that you've had  9 with him personally as opposed to work that  10 you've done with him on studies?  11 A. It's mostly through citations. He's  12 very well known in this area of foreign body  13 response. That's his area of expertise. He's  14 very well known in that field.  15 Q. Now, we talked about Exhibit No. 6  16 earlier, and I understood that the reason why  17 you cited that paper was for discussion of the  18 foreign body response to implanted materials;  19 correct?  20 A. Yes.  21 Q. What specifically is it about the  22 Anderson paper that's important to your  23 opinions?  24 A. There's a number of papers by other</p>

40 (Pages 154 to 157)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 158</p> <p>1 researchers as well. This is, I think, a  2 particularly well written concise review  3 summarizing his 30 years of work in this area.  4 So it's -- I would say that he's a key thought  5 leader in the field, and this is a very nicely  6 written paper and it's useful for citing.  7 Q. Let's go to 2.4 of Exhibit 6 which is  8 the Anderson paper.  9 A. Okay.  10 Q. And the heading is Consequences of  11 Foreign Body Giant Cell Formation.  12 A. Right.  13 Q. Right in the middle of that  14 paragraph, it says, For example, additional  15 polymers such as polypropylene used in  16 artificial joints or polypropylene used as a  17 suture material may undergo surface oxidation  18 by the ROIs.  19 A. Yes.  20 Q. Medical devices and prostheses  21 composed of addition polymers usually contain  22 small amounts of antioxidants to inhibit this  23 oxidative processes. Do you see that?  24 A. Yes.</p>	<p style="text-align: right;">Page 160</p> <p>1 Q. It's the paragraph that begins "these  2 studies."  3 A. Oh.  4 Q. The paragraph ends with, The chemical  5 and molecular composition of the primary  6 structure of the polyurethane polymer is known  7 to modulate or inhibit the process of  8 environmental stress cracking and degradation.  9 And that's by adding these antioxidants;  10 correct?  11 A. No. That's not what he's saying at  12 all. I think you're misreading this paragraph.  13 So he says, These studies identify  14 the importance of the use of antioxidants to  15 inhibit the oxidation process. Okay. So he's  16 saying that people use it.  17 Then he says, The persistence of the  18 foreign body reaction and the fact that it is  19 present at the interface between the tissue and  20 the device for the lifetime suggests that the  21 oxidation process is continuous albeit at low  22 levels. In general, chemical degradation and  23 physical damage in pacemaker leads most  24 probably have a synergistic effect on the</p>
<p style="text-align: right;">Page 159</p> <p>1 Q. Has Dr. Anderson, to your knowledge,  2 ever written that adding small amounts of  3 antioxidants to inhibit this oxidative process  4 is not sufficient to protect against the  5 degradation of polypropylene?  6 A. I don't think he's saying here that  7 it works or doesn't work. I just think he's  8 saying that this is what people do.  9 Q. My question is, are you aware of him  10 writing anywhere that the use of antioxidants  11 doesn't work?  12 A. Again, he's not saying it works here  13 either. He's not saying it works or doesn't  14 work.  15 Q. If you go to the next page under  16 figure 3, it says again that these studies  17 clearly identify the importance of the use of  18 antioxidants in these polymers to inhibit the  19 oxidation process that occurs with the foreign  20 body reaction.  21 A. It says that in the text? Where does  22 it say --  23 Q. It's under "device failure."  24 A. Yeah. Which paragraph?</p>	<p style="text-align: right;">Page 161</p> <p>1 failure of the insulation.  2 What he's saying in the last  3 paragraph is -- this is what I was talking  4 about earlier. When he says the chemical and  5 molecular composition of the primary structure,  6 "primary structure" refers to the backbone of  7 the polymer.  8 So a polyether urethane is known to  9 be very sensitive to oxidative degradation and  10 its consequent environmental stress cracking.  11 Polycarbonates or polysiloxane urethanes are  12 less sensitive.  13 So he's saying that the structure of  14 the urethane backbone, whether it's a polyether  15 or polycarbonate in the polyurethane backbone  16 is a contributing factor to this. He's not  17 talking about antioxidants there.  18 Q. Is it fair to understand that you  19 consider Dr. Anderson to be one of the leading  20 authorities in understanding the extent to  21 which a foreign body reaction to biomaterials  22 may impact oxidation?  23 A. I wouldn't say it that way. I would  24 say that Dr. Anderson spent a very long career</p>

41 (Pages 158 to 161)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 162</p> <p>1 studying the response to the body through the 2 foreign body reaction to implanted 3 biomaterials. That's what this paper is 4 talking about. 5 Q. Have you ever had discussions with 6 Dr. Anderson about whether antioxidants added 7 to polypropylene can sufficiently inhibit 8 oxidation of the polypropylene to allow the 9 medical device to perform its intended 10 function? 11 A. I've not discussed that with 12 Dr. Anderson, but he's not saying that in this 13 statement. He's saying you can add 14 antioxidants to try to help it, but the problem 15 is that reaction is never going to stop. So 16 how do you know how much to add? 17 Ethicon's own data showed that when 18 they add antioxidants, it's depleted after 19 seven or eight years. So it didn't totally 20 work. 21 Q. That's in that one study we talked 22 about? 23 A. Yeah. And I haven't seen any other 24 studies -- in one of the memos, they said that</p>	<p style="text-align: right;">Page 164</p> <p>1 about -- what I'm saying is, I'm not seeing any 2 evidence here even in this presentation -- 3 they're talking about oxidation, and there's 4 really nothing here that suggests that these 5 studies, looking at a dose response, how much 6 do you have to dose the polypropylene to 7 protect it from oxidation? 8 There's no evidence that this was 9 looked at after this document in 1987. We 10 couldn't find anything. 11 Q. Did you ask anybody? 12 A. We did. Well, Dr. Dunn, like I said, 13 we talked about it. He talked with the 14 attorneys requesting, but I don't think these 15 documents could be found. 16 Q. Okay. 17 A. That's what I know. So the only 18 thing that I know about it is what's in these 19 memos and these presentations where basically 20 they're recognizing that there's oxidative 21 degradation. 22 But there's really no discussion of, 23 Hey, let's do a dose response study. There's 24 e-mails that say should we look at this. And,</p>
<p style="text-align: right;">Page 163</p> <p>1 they were looking at this. What reference is 2 that? 3 Q. It was 18, 19, and 20. 4 A. I think it was No. 20. They said -- 5 there's a memo, a follow-up to -- I think this 6 was a -- well, the meeting minutes from the 7 Prolene explants. 8 And, basically, it's summarizing 9 those human explants that I was talking about 10 earlier. And then there's a point on here at 11 the top of page 2, it says, Mr. Burkley is 12 planning to look at the remaining dry explants 13 by IOR. He will also try to see the 14 relationship between the amount of stabilizers 15 added to the polymer and degradation and 16 cracking. 17 You know, we never -- we couldn't 18 find anything further on that. In a number of 19 these presentations that I have also from 20 Ethicon -- I can pull some of these up. This 21 would be -- 22 Q. That's your rebuttal report. I'm not 23 there yet. 24 A. I know. But you're asking me</p>	<p style="text-align: right;">Page 165</p> <p>1 again, there's no evidence that I've seen that 2 it's being looked at. 3 I guess I'm just saying it's unknown 4 and, to my knowledge, it's not been looked at. 5 Q. Did you ask to see all of the 6 degradation work that Ethicon has in its files 7 related to polypropylene? 8 A. I believe that Dr. Dunn did. I even 9 think Dr. Burkley was asked -- and I don't know 10 if I have that deposition in front of me. 11 But I believe that in Dr. Burkley's 12 deposition, he really was talking about the dog 13 study. To our knowledge, there weren't other 14 studies. 15 (Exhibit 10 was marked.) 16 Q. (By Mr. Thomas) Let me show you 17 what's been marked as deposition Exhibit 18 No. 10. Deposition Exhibit 10 is a letter from 19 me to counsel in this case enclosing a list of 20 studies about which Ethicon testified at what's 21 known as a Rule 30(b)(6) deposition on various 22 studies that were conducted by Ethicon over the 23 years. 24 And if you look at page 3 of Exhibit</p>

42 (Pages 162 to 165)

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Scott A. Guelcher, Ph.D.

<p style="text-align: right;">Page 166</p> <p>1 No. 10, there is a topic known as 2 "degradation." 3 A. Uh-huh. 4 Q. And I take it that other than the dog 5 study, you've not seen any of these degradation 6 studies where Ethicon has looked at to the 7 extent to which these -- the Ethicon 8 polypropylene degrades in vivo? 9 MR. JACKSON: Objection to form. 10 A. I haven't seen these studies. 11 Q. (By Mr. Thomas) Okay. 12 A. This is just a list of -- 13 Q. They're available. 14 MR. THOMAS: Let's go off the record, 15 please. 16 (A break was taken from 2:41 p.m. 17 until 3:09.) 18 MR. THOMAS: While at recess, I've 19 had a number of conversations with counsel 20 for the plaintiff about the unavailability 21 of the time records that are the subject of 22 the deposition as well as the late service 23 of the rebuttal report and the anticipated 24 production of a rebuttal report for Dr. Dunn</p>	<p style="text-align: right;">Page 168</p> <p>1 CERTIFICATE OF COURT REPORTER 2 I, Marilyn Morgan, Licensed Court 3 Reporter and Notary Public for the State of 4 Tennessee, do certify that the above deposition 5 was reported by me and that the foregoing 6 transcript is a true and accurate record to the 7 best of my knowledge, skills, and ability. 8 I further certify that I am not an 9 employee of counsel or any of the parties, nor 10 a relative or employee of any attorney or 11 counsel connected with the action, nor 12 financially interested in the action. 13 I further certify that I am duly 14 licensed by the Tennessee Board of Court 15 Reporting as a Licensed Court Reporter as 16 evidenced by the LCR number and expiration date 17 following my name below. 18 Subscribed and sworn to before me when 19 taken, this 25th day of March, 2014. 20 21 22 MARILYN MORGAN, LCR #235 23 Expiration Date: 6/30/14 24 Notary Public, State of Tennessee Commission expires: 6/18/17</p>
<p style="text-align: right;">Page 167</p> <p>1 whose deposition is scheduled for tomorrow. 2 Counsel and I have agreed that we 3 will stop the deposition of Dr. Guelcher 4 today to resume at a later date; at which 5 point, I will be able to inquire about the 6 billing records which will be produced as 7 well as the scope of the rebuttal report. 8 In addition, counsel has agreed to 9 talk to me tomorrow about a date for 10 Dr. Dunn; at which time, we will find a 11 date hopefully to resume Dr. Guelcher and 12 to complete Dr. Dunn in a day, the goal 13 being that we only have one day for 14 Dr. Dunn for both his initial report and 15 whatever rebuttal report he prepares so 16 that we get this done as efficiently as we 17 can. I think that's the scope of the 18 agreement. 19 MR. JACKSON: You have represented it 20 as I understand it. 21 MR. THOMAS: That's all. Thank you, 22 Dr. Guelcher. 23 FURTHER THIS DEPONENT SAITH NOT. 24 (Deposition adjourned at 3:10 p.m.)</p>	<p style="text-align: right;">Page 169</p> <p>1 INSTRUCTIONS TO WITNESS 2 3 Please read your deposition 4 over carefully and make any necessary 5 corrections. You should state the reason 6 in the appropriate space on the errata 7 sheet for any corrections that are made. 8 After doing so, please sign 9 the errata sheet and date it. It will be 10 attached to your deposition. 11 It is imperative that you 12 return the original errata sheet to the 13 deposing attorney within thirty (30) days 14 of receipt of the deposition transcript 15 by you. If you fail to do so, the 16 deposition transcript may be deemed to be 17 accurate and may be used in court. 18 19 20 21 22 23 24</p>

43 (Pages 166 to 169)

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Scott A. Guelcher, Ph.D.

Page 170

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Page 171

## ACKNOWLEDGMENT OF DEPONENT

I, \_\_\_\_\_, do  
hereby certify that I have read the  
foregoing pages, and that the same  
is a correct transcription of the answers  
given by me to the questions therein  
propounded, except for the corrections or  
changes in form or substance, if any,  
noted in the attached Errata Sheet.

SCOTT A. GUELCHER, PH.D.      DATE \_\_\_\_\_

Subscribed and sworn  
to before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My commission expires: \_\_\_\_\_

Notary Public \_\_\_\_\_

44 (Pages 170 to 171)

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